

**GOVERNMENT OF INDIA
HYGIENE DEPARTMENT.**

THE PLAGUE IN INDIA,

1896, 1897.

**COMPILED BY R. NATHAN,
INDIAN CIVIL SERVICE.**

**Vol. II.
APPENDICES I TO VI.**



SIMLA:
PRINTED AT THE GOVERNMENT CENTRAL PRINTING OFFICE.
1898.

**GOVERNMENT CENTRAL PRINTING OFFICE,
SIMLA.**

LIST OF APPENDICES.

I TO VI.

- I.—Description of Plague : its Causes and Characteristics.**
- II.—Previous History of Plague in India.**
- III.—Statistical Statements.**
- IV.—Regulations under the Epidemic Diseases Act.**
- V.—Measures in the City of Bombay.**
- VI.—Measures in the Bombay Presidency and Sind.**

APPENDIX I.

DESCRIPTION OF PLAGUE : ITS CAUSES AND CHARACTERISTICS.

PAPER Nos.	CONTENTS.	PAGES.
1—2.	Papers regarding the rumour of Plague in Calcutta—	
	1. Note by the Special Calcutta Medical Board.	3—6
	2. Note by Brigade-Surgeon-Lieutenant-Colonel D. D. Cunningham	6—8
3.	M. Haffkine's instructions for diagnosing plague	8—10
4—7.	Reports by Mr. E. H. Hankin on the experiments made by him with various commodities to test their capacity for engendering or supporting plague	10—19
8.	Despatch from the Government of Bombay to the Secretary of State on the subject of plague and domestic animals	20—21
9.	Remarks on the treatment of plague by Dr. James Cantlie	21—28
10—11.	Reports by M. Haffkine on experiments with curative serum	29—32
12—18.	Reports by M. Haffkine and Dr. Lyons on experiments with prophylactic serum	32—56



APPENDIX I.

DESCRIPTION OF PLAGUE : ITS CAUSES AND CHARACTERISTICS.

Papers regarding a rumour of plague in Calcutta.

No. 1. NOTE BY THE SPECIAL CALCUTTA MEDICAL BOARD.

The following eleven cases have been reported to the Medical Board as cases of bubonic plague in Calcutta, besides certain cases in the Fort, which, on enquiry, proved to be ordinary non-venereal buboes :—

- * One case in Howrah.
- * One case in Chatawallah Lane.
- * Two cases in Manicktolla Hospital.
Two cases in the Presidency General Hospital.
- * One case in Raja Raj Bullub Street.
- * One case in Armenian Street.
One case in Wooltadanga.
One case in Garden Reach.
One case in Warris Bagan Lane.

In the cases marked with an asterisk, the plague bacillus is said to have been found in the blood of the persons attacked. Three others were found to be cases of simple enlarged glands, fever and bronchitis and intestinal obstructions respectively. The result of the examination of the blood of the two cases in the Presidency General Hospital is not known to us. As a full history of all these eleven cases is contained in the appendix to this report, it is not necessary to recapitulate them here, and a summary of the conclusions drawn from these will therefore be sufficient in this place.

The bacillus is also said to have been identified in the case in Raja Raj Bullub Street which terminated fatally. This case was first reported by a homœopathic practitioner to the Health Officer of Calcutta by postcard on the evening of the 2nd November. It was seen by Drs. Cobb and Simpson on the 3rd at 5-30 P.M., and the man died in their presence at 6-30 the same evening. They reported it "as a fatal case of true plague." The Board of Health did not hear of this case till the following day, after the body had been disposed of, and then only from private information. An interval of nearly

20 hours occurred between the time the case was first seen by the homœopathic practitioner and the time it was inspected by Drs. Cobb and Simpson. It is to be regretted that Drs. Cobb and Simpson did not call in one of the medical members of the Board, who would have been only too willing to go and see "a true case of plague." The omission is the more unfortunate, because doubt had arisen in the public mind regarding the diagnosis of the previous cases. Drs. Dyson and Robson-Scott, however, as soon as they heard of the case, proceeded to the spot and made minute enquiries concerning it, with the result that it was clear that other reasons existed for the enlargement of the glands in the groin, which was reported to be one of the prominent features of the case.

The most noticeable point in the suspicious cases that have occurred is the fact that all the patients in whose blood the plague germ is said to have been found recovered, with the single exception of the case in Raja Raj Bullub Street, and in this case, as already stated, the symptoms noticed can reasonably be ascribed to other causes. Another remarkable fact is that none of these six sporadic suspicious cases produced any infection either in the neighbourhood or even amongst the people who attended the sick.

Looking only to the clinical symptoms set forth in the appendix to this report, we have no hesitation in expressing our emphatic opinion that none of these cases, including the fatal case of Bipin Behari Dutt, can properly be described as cases of bubonic plague. It may be inferred, however, from the reports which have come before us that the diagnosis made by the Health Officer and Dr. Cobb is based not so much upon the symptoms of the patients as upon the supposed presence in their blood of a microscopic organism stated to be "the plague bacillus." We proposed, therefore, to examine the evidence bearing on this point, and to state how far the conclusions arrived at by Drs. Cobb and Simpson are borne out by the independent investigations carried on by our colleague, Dr. Cunningham.

Dr. Cunningham has received from M. Haffkine a type-culture and several microscopic preparations of the plague bacillus as occurring in Bombay. These agree in their characters with those described as characteristic of the plague bacillus as found in China, and there can be no reasonable doubt that the Bombay bacillus is the same as that which is regarded by M. Yersin and Professor Kitasato as the specific cause of plague.

Dr. Cunningham has also personally obtained twenty microscopic preparations and fifteen cultures of blood from seven distinct cases of supposed plague, six of which occurred among men in the Shropshire Regiment. The microscopic preparations show nothing, except that

some of the subjects suffered from anæmia; while the cultures have without exception remained absolutely sterile.

A series of cultures and preparations of local origin was received by Dr. Cunningham from Drs. Simpson and Cobb. None of these exhibit the characters of the standard type. In one instance only does the growth in the form of colonies present some similarity to that of the type specimen; but in this case the microscopic characters do not resemble those of the Bombay bacillus. In another case the culture yielded an absolutely pure growth of a large *staphylococcus*, which is of common occurrence in the air; while the corresponding blood preparation showed evidence of contamination from other sources in the presence of a certain number of slender bacilli. In a third culture there was a pure growth of a form of *schizomycete* or fungus, of which neither the colonies nor their constituent elements bore the remotest resemblance to the plague bacillus. A fourth culture prepared from the blood of Bipin Behari Dutt contained large bacilli, probably of a putrefactive character, along with minute *cocci* and *diplococci*; but in the microscopic preparation of the blood only the large bacilli could be recognised. The remaining cultivations of local origin are pure cultivations of *cocci* and *diplococci* not agreeing in character with the type specimen, and not distinguishable from forms which are liable to occur in, and on almost any organic medium as the result of contamination. As the phenomena of three out of the four cases expressly referred to above furnish conclusive evidence that actual contamination occurred, there is no certain proof that in the remaining cases the minute organisms discovered were really derived from the blood.

In the case of Bipin Behari Dutt, whose clinical symptoms we have already discussed, a specimen of blood and some blood-cultures were sent to Dr. Cunningham, together with portions of a rat into which 2 cubic centimetres of a culture of blood had been injected, causing its death after thirty-one hours. The specimen of blood and the cultures showed, as has been mentioned above, unequivocal evidence of contamination by the presence of large bacilli, probably of a putrefactive character, which must have gained access to the preparation from outside.

This being so, it is clear that the smaller *cocci* and *diplococci* which were also found may equally have been the result of contamination. Nor does the death of the rat after inoculation afford any grounds for inferring the specific character of the germs contained in the culture, with which the animal was inoculated, for the bulk of actively decomposing fluid injected into the animal was relatively equivalent to over a pint in the case of an adult human being and was

quite sufficient to cause death by mere blood poisoning. Moreover, had the enormous number of microscopic organisms introduced into the rat possessed the specific character attributed to them, the blood and tissues ought after death to have absolutely swarmed with the organisms, whereas in fact only a very scanty sprinkling of minute *cocci* and *diplococci* could be found in the specimens submitted to Dr. Cunningham.

Looking to the evidence as a whole, we have no hesitation in expressing our opinion that there is no evidence that any case of true bubonic plague has yet occurred in Calcutta; and that the cases which have been reported to us as plague were so described on the strength of an opinion as to the origin and character of certain microscopic organisms, which has not been confirmed by the results of an independent inquiry conducted by an expert of long experience in bacteriological research.

NOTE BY BRIGADE-SURGEON-LIEUTENANT-COLONEL CUNNINGHAM.

In a previous note regarding the alleged bacteriological demonstration of the occurrence of cases of plague in Calcutta in October and November, it has been shown that the evidence was of no value on the following grounds :—

1st.—That in certain cases there was unequivocal evidence that the samples of blood from which cultivations of alleged plague bacilli had been obtained were, from the outset, contaminated from external sources.

2nd.—That the growths present in what were affirmed to be type-specimens of cultivations of Calcutta plague bacilli, which had been obtained from the blood of different alleged cases of plague, were absolutely different in different instances.

3rd.—That in no case did the growths accurately correspond in character with those of type-specimens obtained from Bombay from M. Haffkine.

4th.—That specimens of blood, taken from cases, which on bacteriological grounds had been affirmed to be unequivocal cases of plague, failed to yield any growths whatever when taken and cultivated under conditions unfavourable to extraneous contamination.

5th.—That the evidence derived from the results of inoculating animals with the alleged plague bacilli was of no value whatever, because of the method in which the experiments were carried out.

I have now to point out that all of the so-called Calcutta plague bacilli may be readily obtained from specimens of the blood of perfectly healthy animals under the influence of brief exposure to air, even in scrupulously clean localities, such as my laboratory is, in which the air is in no way exposed to any special chances of bacterial contamination.

The data derived from the following experiment will probably be sufficient to demonstrate this.

On the 11th December 1896 about 30 C.C. of blood were drawn from the jugular vein of a perfectly healthy fowl, under strictly aseptic conditions, into two sterilised test tubes, A & B, stoppered, as usual, with cotton-wool plugs. Half an hour later the plug was removed from tube A and small quantities of blood were introduced into four watch glasses exposed to the air for 20 minutes, and then set in an incubator.

Cultivations from these specimens subsequently yielded growths, which in all microscopical and macroscopical characters were identical with—

1st.—The only growth yielded by a cultivation of blood sent to me by Dr. Cobb, and derived from an alleged case of plague at Chinsurah.

2nd.—The growth from another type-cultivation obtained from a man named Feney in the Station Hospital, and sent to me by the Health Officer of Calcutta as a type-specimen of plague bacilli.

3rd.—The large putrefactive bacillus which was present in the original specimen of blood, and in the bouillon cultivation of the latter, sent to me by the Health Officer of Calcutta as evidence that a man named Bipin, who died in Calcutta early in November, had been suffering from plague.

The tube B containing the other sample of blood was sealed up after a few days to avoid evaporative loss, and showed no signs of decomposition up to the 31st December, or three weeks after it had been taken. Three cultivations of it were then made and yielded no growth whatever. On the 3rd January portions of the clot were removed, set in four watch glasses, exposed in the open laboratory for 20 minutes, and then placed in an incubator.

Decomposition rapidly set in in all of them, and they subsequently yielded growths of the following characters:—

- *1st.*—The large putrefactive bacillus, noted above as occurring in the Health Officer's specimen of blood, and his cultivation of the latter from the case of Bipin.

2nd.—Small cocci and diplococci similar to those in the Health Officer's cultivation of the same case, but more closely agreeing in characters with those described as distinctive of the plague bacillus, in that they were completely bleached by treatment with solutions of iodine according to the method of Gram.

3rd.—A schizomycete, which in all characters, macroscopical and microscopical, was similar to that which was present in a cultivation derived from the blood of the man Cotta in Howrah, and supplied by the Health Officer as a type-specimen of plague bacilli.

The evidence here is as complete as it well could be. The results in the case of sample B show that the blood previous to exposure to air contained no bacterial organisms, and those following even brief exposure of portions of A and B to the chance of contamination, equally clearly demonstrate that various forms of schizomycetes, presenting all distinctive characters of those alleged by the Health Officer to be specific plague bacilli, are common aerial contents, and therefore liable to appear in any cultivations of blood not conducted under strictly aseptic conditions.

The 7th February 1897.

M. Haffkine's instructions for diagnosing plague. N

1. Symptoms of disease:

Fever preceded sometimes by rigor. Trembling in the limbs. Pain, swelling, and hardening of one or rarely several superficial glands, most frequently of one in the groin, more rarely in a gland or glands of the armpit or of the cervical region.

Delirium. Sometimes restless efforts at vomiting which may or may not be successful; constipation, or occasionally, on the contrary, diarrhoea.

Comatose or semicomatose state of patient. Voice weak, speech incoherent.

2. The most prominent of these symptoms is the affection of superficial glands; cases, when this symptom is absent, if there are any, appear quite exceptionally.

3. In a case of plague a microscopic preparation, made with the contents of the affected gland, will show numerous diplobacteria of characteristic shape and size, described for the first time by Kitasato in Hong-kong.

4. To obtain the microbes with certainty a patient is to be selected at the height of the symptoms, with glands largely increased, and before any injections had been made into the glands. At the commencement of the swelling, or in a convalescent patient, drop withdrawn from the gland may fail to show the microbes.

5. For making a preparation, an ordinary or a grooved needle, a spirit lamp, a microscopic slide and 5 per cent. carbolic lotion is to be prepared. Then proceed as follows :—

Wash the skin just over the swollen gland with carbolic lotion. Allow the lotion to dry *in situ*; pass the needle in the flame of a spirit lamp and leave it to cool down. Steady the gland with the fingers of left hand, so as to make it quite prominent, with the skin tightly drawn over it; and prick the gland through the skin. Press out a drop of the whitish contents of the gland, withdraw the needle and burn the part of it which has been introduced under the skin of the patient, till it is red hot. Apply the slide to the drop of lymph pressed out of the gland, and spread it as uniformly as possible over about a half of the surface of the slide, avoiding any contact between the infective material and the fingers or any other object.

6. Keep the slide in the hand till it is dry, and while holding it in the hand by its free end, pass it rapidly in the flame five or six times, with the preparation upwards, till the lower surface of the slide felt by a finger is too hot to be left in contact with the finger without pain. Excessive heating or charring will make the preparation unrecognisable.

Disinfect the skin over the gland and apply a suitable dressing if necessary.

7. In a certain number of cases, pricking the gland through the skin fails to bring to the surface the characteristic material.

A more certain proceeding is to incise, with aseptic precautions, the skin over the gland, and the gland itself, and to take directly from the gland a drop of lymph on the point of a scalpel, spreading it over a slide as directed above.

8. Another way consists in sucking up a drop from the gland by means of a sterile Pasteur pipette, protected by a cotton plug.* For this cauterise a small spot of the skin just over the gland. Break the fine end of the pipette and pass the thin part of it rapidly through the flame several times. Allow it to cool down and insert the pipette into the cauterised part of skin, steadying the gland with the fingers of left hand. By a boring motion introduce the tip of the

* Messrs. Kemp & Co., Bombay, have been instructed how to prepare such pipettes, and have promised to sell boxes containing a dozen and half dozen of pipettes at the cost price of a few annas a box.

pipette into the gland. The moment when this is reached will be felt by the tissues offering less resistance to the penetration of pipette.

Apply the mouth to the open end of pipette, and while constantly moving the pipette to and fro, suck up a small quantity of fluid. The best is the thick whitish contents of the gland blood to be avoided by changing slightly the direction of the pipette or putting it deeper or more superficially. Withdraw the pipette and blow out a drop of it on the slide, spreading as above.

The pipette is to be burnt immediately after this, and all objects used disinfected.

9. The use of a syringe is not advisable.

10. The slide is stained by any of the aniline dyes and examined with an oil immersion lens, or sent for staining and examination to the *Bubonic Plague Research Committee, Petit Laboratory, Bombay*.

11. Any operation should be avoided with glands situated on the abdomen above Poupart's ligament.

Reports by Mr. E. H. Hankin on experiments to test the vitality of the plague bacillus.

No. 1600, dated Bombay Castle, the 26th February 1897.

From—A. M. T. JACKSON, Esq., I.C.S., Under Secretary to the Government of Bombay, Revenue Department,

To—The Secretary to the Government of India, Home Department.

I am directed to forward, for the information of the Government of India, copies of two reports, dated the 17th and 19th instant, furnished by Mr. E. H. Hankin on researches he has made on various articles of produce as regards their susceptibility to engender or support the bubonic microbe. It will be seen that in his report, dated the 19th instant, Mr. Hankin shows very clearly that the various descriptions of grain and flour usually stored in Bombay contain no trace of the bubonic microbe, and his other report, dated the 17th idem, proves almost to demonstration that grain purposely infected does not permit of the existence of the microbe for more than about four to six days.

2. I am to add that the results of Mr. Hankin's researches have been telegraphed to Dr. Cleghorn at Venice with a request that they may be communicated to the Sanitary Conference now sitting in that city. Copies of the reports have also been sent to Dr. Cleghorn.

No. 5.

Dated Bombay, the 17th February 1897.

From—E. H. HANKIN, Esq., Chemical Examiner and Bacteriologist,
North-Western Provinces and Oudh,

To—The Secretary to the Government of Bombay.

In accordance with Government Order No. $\frac{564}{107-P}$, dated 2nd February, I have the honor to submit the following report on the vitality of the bubonic plague microbe in the chief grain exports from Bombay.

2. My experiments have been carried out with numerous specimens of the following articles :—

Linseed.	Castor seeds.
Yellow rapeseed.	Poppy seeds.
Brown „	Wheat (new hard red).
Tilseed or gingelly seed.	„ (another lighter variety).
Groundnuts.	Flour.

3. In order to test whether the microbe was still present in a living condition in a specimen of previously infected grain, my method has been to make an extract of this grain and to inject it into a mouse. The great susceptibility of mice to bubonic plague and to infectious diseases in general, while advantageous in one sense, has been disadvantageous in another, in that the mice might have died owing to the presence of other microbes than the bubonic in the grain. In some cases the *post mortem* appearances have suggested that this has occurred; but, as it is impossible to give an absolute proof that the bubonic microbe had nothing to do with the death of the animal in these cases, I have in general regarded the survival of the mouse as the only adequate proof that the microbe in question was no longer living in the previously infected grain.

4. My first experiment was carried out with the bubonic plague microbe derived from cultures on agaragar. Two cultures, each about a week old, were employed. Of those, one had been derived from a patient in Bombay, the other had been recently isolated from a rat found dead of the plague. The growth was scraped off the surface of the jelly and well-shaken up in 15 cubic centimetres of bouillon. The mixture was then placed in a burette. A sample of the grain to be tested, weighing about a kilogram, was placed in a previously sterilised stoppered foot-glass. One cubic centimetre of the bouillon emulsion of the microbe was then poured into the foot-glass, care being taken that it should fall into the centre of the grain. The stopper was replaced, and the foot-glass was immediately violently shaken for about a quarter of an hour. At the end of this time all traces of moisture from the bouillon that had been added had completely vanished. On shaking, a cloud of dry dust could be seen in the air and in the foot-glass. In order to avoid inhaling this presumably

infected dust, the next part of the experiment was carried out in the open air. The grain was poured from the foot-glass into the linen bag in which I had received the specimen. From the bag a bulk of about 40 cubic centimetres was poured into a measuring glass that had been previously sterilised. This small bulk of grain was then wetted with sterile bouillon and stirred up with a glass rod. About a half to a quarter of this bouillon was sucked up into a pipette and injected into a mouse. The white mice employed had generally been in my possession for some time. Each lived in a separate cage. The cage before being occupied had in all cases been sterilised in an autoclave. The pipettes employed for the injections were always disinfected by boiling in water previous to use. The skin of the mouse at the point of inoculation was previously to the injection rubbed with a mixture of carbolic acid, water, and alcohol.

5. The extracts made in this manner were as soon as possible injected after the infection of the grain into mice with the following results :—

Mouse treated with extract of linseed ... Died within 24 hours.

"	"	"	yellow rape-			
			seed ...	"	"	72 "

"	"	"	brown rape-			
			seed ...	"	"	24 "

"	"	"	tilseed ...	"	"	48 "
---	---	---	-------------	---	---	------

"	"	"	groundnuts	"	"	24 "
---	---	---	------------	---	---	------

"	"	"	castor seed	"	"	24 "
---	---	---	-------------	---	---	------

"	"	"	poppy seed	"	"	24 "
---	---	---	------------	---	---	------

"	"	"	wheat (new,			
			hard, red)	"	"	48 "

"	"	"	wheat (of an-			
			other kind)			Survived.

"	"	"	flour ...			Died within 48 hours.
---	---	---	-----------	--	--	-----------------------

6. Two days after the infection of the grain specimens were again taken, extracted in exactly the same manner as before and injected into another series of mice with the following results :—

Mouse treated with extract of linseed ... Died within 7 days.

"	"	"	yellow rape-			
			seed ...	"	"	24 hours.

"	"	"	brown rape-			
			seed ...	"	"	4 days.

"	"	"	tilseed ...			Survived.
---	---	---	-------------	--	--	-----------

"	"	"	groundnuts			Died within 11 days.
---	---	---	------------	--	--	----------------------

"	"	"	castor seed	"	"	48 hours.
---	---	---	-------------	---	---	-----------

"	"	"	poppy seed	"	"	48 "
---	---	---	------------	---	---	------

- Mouse treated with extract of wheat (first variety) ... Survived.
- " " " wheat (second variety)
- " " " flour ... Died within 48 hours.

7. At this time I found out that an extract of castor seeds to which no bubonic microbes had been added was equally fatal as the infected seeds to mice, and consequently was obliged to omit this article from my experiments. The reason of this is that the castor seeds contain a poison, known as ricin, which is intensely active on subcutaneous injection. On stirring up the seeds with bouillon, as described, caused a fatal dose to pass into solution. The mouse injected with such an extract would certainly die whether or not the bubonic microbe was present. If I made the extract of the seeds so rapidly that a fatal dose of the poison would not be dissolved, I could have no certainty that sufficient time had elapsed to allow the microbes to pass into suspension in the bouillon.

Four days after the commencement of the experiment, extracts of the grain were again made as before and injected into mice as follows:—

- Mouse treated with extract of linseed ... Died after 13 days.
- " " " yellow rape-seed ... Survived.
- " " " brown
- " " " tilseed
- " " " groundnuts ..
- " " " poppy seed ..
- " " " wheat (first variety) ..
- " " " wheat (second variety) ..
- " " " flour

9. Eleven days after the commencement of the experiments, extracts were again injected. A change in procedure was made in this case, in that the grains, instead of being merely stirred in a measuring glass with a glass rod in order to produce the suspension in the bouillon, were slightly ground up in a mortar until the mixture

of bouillon and debris was so thick that I could with difficulty suck it up into the pipette. The results obtained were as follows:—

Mouse treated with extract of linseed ... Survived.

"	"	"	yellow rape-			
			seed ...	"		
"	"	"	brown rape-			
			seed ...	Died within 24 hours.		
"	"	"	tilseed ...	"	"	7 days.
"	"	"	groundnuts	"	"	24 hours.
"	"	"	poppy seed	"	"	24 "
"	"	"	wheat (first			
			variety) ...	"	"	24 "
"	"	"	wheat (second			
			variety)	"	"	24 "
"	"	"	flour ...	"	"	24 "

10. Thirteen days after the commencement of the experiment, extracts were again injected into mice with the following results. In this as in later experiments the grain was extracted by grinding it in a mortar with the bouillon:—

Mouse treated with extract of linseed ... Survived.

"	"	"	yellow rape-			
			seed ...	Died after 24 hours.		
"	"	"	brown rape-			
			seed ...	Survived.		
"	"	"	tilseed ...	"		
"	"	"	groundnuts	"		
"	"	"	poppy seed	"		
"	"	"	wheat (first			
			variety)	"		
"	"	"	wheat (second			
			variety)	"		
"	"	"	flour ...	"		

11. The mouse treated with the yellow rapeseed extract showed no appearances microscopically or otherwise of having succumbed to bubonic infection. There was nothing noteworthy at the seat of inoculation in the back, but there was an extensive blood-stained œdema on the underside of the neck, but appearances suggesting that it had died from some accidental infection.

12. The above experiment indicates that the bubonic microbe derived from pure cultures perishes within thirteen days after being added to the abovementioned specimens of grain and seeds. The question now arises whether the microbe would show a greater or

lesser degree of resistance when derived from the organs of animals dead of the disease. A reply to this question is given in the following experiment.

13. The spleen of a rat and the spleen, liver, and cedema from a mouse—both animals having died after plague inoculation—were ground up in a sterile mortar with powdered glass and mixed with 10 cubic centimetres of bouillon. One cubic centimetre of the mixture was added to half a kilogram of each of the specimens of grain immediately and violently shaken as in the previous experiment. Extracts were at once injected into mice with the following results:—

Mouse injected with linseed	...	Died within 48 hours.
" " " yellow rapeseed	...	Survived.
" " " brown "	...	Died in 5 days.
" " " tilseed	...	" " 6 "
" " " groundnuts	...	" " 6 "
" " " poppy seed	...	Survived.
" " " wheat (second variety)	...	Died in 4 days.
" " " flour	...	" " 4 "

14. The fact that two mice in this series survived, and that the others only succumbed after an unusual delay may be due to the fact that the grains were extracted very rapidly with the bouillon and not ground up in it as in the preceding and following experiments. Consequently it is probable that fewer microbes than usual became suspended in the bouillon extracts.

15. Two days later, extracts were again made and injected into mice as follows:—

Mouse treated with extract of linseed	...	Died within 24 hours.
" " " yellow rapeseed	...	" " 24 "
" " " brown rapeseed	...	" " 24 "
" " " tilseed	...	Survived.
" " " groundnuts	...	Died in 24 hours.
" " " poppy seed	...	" " 3 days.
" " " wheat	...	Survived.
" " " flour	...	" "

16. Four days after the commencement of the experiment, extracts were again made and injected as follows:—

• Mouse treated with extract of linseed	...	Died in 5 days.
" " " yellow rapeseed	...	" " 3 "

Mouse treated with extract of brown rapeseed ... Died in 2 days.

" " " tilseed ... Survived.

" " " groundnuts "

" " " poppy seed "

" " " wheat ... "

" " " flour ... "

17. The above mice that died shewed no appearances under the microscope or inculturally suspicions of bubonic plague. Their spleens were injected into three other mice which have remained in good health.

18. Six days from the commencement of the experiment, extracts were again injected into mice with the following results:—

Mouse treated with extract of linseed ... Survived.

" " " yellow rapeseed ... "

" " " brown rapeseed ... "

" " " tilseed ... Survived.

" " " groundnuts ... "

" " " poppy seed ... "

" " " wheat ... "

" " " flour ... "

19. Thus, in this experiment grain infected with the organs of animals dead of the plague lost its infectious power completely within six days.

20. The remaining point of the enquiry is the resisting power of the microbes as it exists in secretions of the human patient. For this purpose I chose the sputum in which the microbe has been shown by Surgeon-Captain Childe, Professor of Pathology in the Grant Medical College, to exist in large numbers and in a very virulent condition.

21. Sputum recently obtained from a patient was mixed with an equal volume of bouillon. One cubic centimetre of the mixture was immediately added as before to each of the specimens of grain. Owing to an accident, the linseed could not be used in this experiment.

22. Extracts made immediately were injected into mice with the following results:—

Mouse treated with extract of yellow rapeseed ... Died within 24 hours.

" " " brown " ... " 24 "

" " " tilseed ... " 24 "

" " " groundnuts ... " 24 "

" " " poppy seed ... " 24 "

" " " wheat ... 48 "

" " " flour ... 24 "

23. Two days later, extracts were again made and injected. The results were as follows:—

- Mouse treated with extract of yellow rapeseed ... Died within 24 hours.
- " " " brown " ... " " 24 "
- " " " tilseed ... " " 24 "
- " " " groundnuts ... " " 28 "
- " " " poppy seed ... " " 24 "
- " " " wheat ... " " 48 "
- " " " flour ... " " 24 "

24. Four days after the commencement of the experiment, extracts were again injected as follows:—

- Mouse treated with extract of yellow rapeseed ... Survived.
- " " " brown " ... Died within 24 hours.
- " " " tilseed ... Survived.
- " " " groundnuts ... "
- " " " poppy seed ... "
- " " " wheat ... Died within 48 hours.
- " " " flour ... " " 48 "

25. Six days after the commencement of the experiment, extracts were made and injected with the following results:—

- Mouse treated with extract of yellow rapeseed ... Survived.
- " " " brown " ... "
- " " " tilseed ... "
- " " " groundnuts ... "
- " " " poppy seed ... "
- " " " wheat ... "
- " " " flour ... Died in 3 days.

26. No reason could be obtained from *post mortem* appearances or cultures for thinking that the last-mentioned mouse had died of bubonic plague. Further, the flour had shown no special capacity for nourishing the bubonic microbe in my other experiments, so that it would appear to be probable that the bubonic microbe had died out in this case as in the other. Nevertheless, I am continuing my experiments with flour and hope to make a separate report to you on the subject in a few days.

27. Earlier experiments carried out with another kind of grain (bajri) has shown me that the bubonic microbe in this case dies out within two days.

28. In these experiments I have kept the grain damp, so that eventually it became covered with mildew. In the experiments now described, by keeping the grain in a dry condition in bags, I imitated more closely the conditions that exist in commerce. Under such

conditions the microbe of bubonic plague appears to die out within from four to six days. In a few instances, my experiments have suggested that it may survive for periods extending up to thirteen days. But it must be remembered that my experiments had to be carried out with the aid of mice owing to the impossibility of obtaining a sufficient supply of healthy rats in Bombay at the present time. It is more probable that the death of the mice in these exceptional instances was due to the accidental presence of other microbes than that unusually resistant forms of the bubonic microbe were present.

Dated Bombay, the 19th February 1897.

No. 6.

From—E. H. HANKIN, Esq., M.A., Chemical Examiner and Bacteriologist, North-Western Provinces and Oudh,

To—The Secretary to the Chamber of Commerce, Bombay.

In reply to your enquiry as to whether I have ever found the bubonic plague microbe in grain and flour, I beg to state that, although I have examined a large number of specimens under different conditions, I have never succeeded in detecting it. My observations have been carried out on both clean and dirty grain, sweepings of granaries, under infected dwellings, grain mixed with rats' dejecta taken from near the body of a dead rat, grain that had been carried by rats through a hole in the wall of a granary and stored in a latrine, but in all cases a negative result has been obtained. I have also examined weevils and other insects parasitic on stored grain without detecting the microbe. I have recently examined flour from a small godown in the Fort in which rats had been dying of the plague with a negative result.

2 It is my opinion that the only connection of grain with the plague in Bombay is that, at the beginning of the outbreak, larger numbers of rats were affected, and that these animals were specially common in the neighbourhood of granaries.

Dated Bombay, the 31st March 1897.

No. 7.

From—E. H. HANKIN, Esq., M.A., Chemical Examiner and Bacteriologist, North-Western Provinces and Oudh and Central Provinces,

To—The Secretary to the Government of Bombay, Revenue Department.

I have the honour to acknowledge the receipt of your No. 2503 of 30th March, enclosing copies of correspondence on the subject of wool infection, and asking for my opinion.

2. In reply I beg to state that as my researches are not completed, I can only form provisional conclusions on the subject. So far as my researches go, they tend to show that the bubonic microbe whether derived from cultures or the organs of deceased animals, and whether placed on cotton or sheep's wool or gunny cloth, uniformly dies out within six days. Owing, however, to the fact that epidemiological evidence tends to show that clothing may in rare cases convey the infection, I am unwilling to draw any definite conclusion from my researches at present. It is possible that under other conditions the microbe might present a greater resistance in wool than I have hitherto found it to possess. However this may be, there is some *à priori* probability that cleaned wool would be less likely to retain the infection than dirty clothes more or less saturated with human secretions.

3. In my experiments, in which the microbe was found to die out in six days, the wool was tightly pressed into widemouthed bottles immediately after infection. In Bombay, and I presume in Karachi, after washing, the wool is exposed to sunlight, which there is every reason for believing would tend to hasten the disappearance of the infection.

4. The fact that the trade in wool is in the hands of native merchants adds greatly in my opinion to the difficulty of enforcing sanitary precautions. The only attempt at disinfection that I consider feasible would be that the bales should be painted with five per cent. carbolic acid on arrival at the docks under the supervision of a port official.

5. In dealing with this almost, but not quite *negligeable* risk of importation of the plague, I suggest that the English Government should adopt a modification of the plan that it has already employed in the case of cholera with conspicuous success. During the last two cholera epidemics in Europe, nearly every country was invaded by the disease in spite of quarantine. England alone had no cholera and no quarantine. The method adopted was to allow suspected persons to go where they pleased, provided their names and addresses were known. They were kept under careful supervision, and in the event of cholera developing they were immediately isolated, and the disease thus prevented from spreading. I suggest that this system should be applied, *mutatis mutandis*, to suspected goods from Bombay. That is to say, that the importation of wool in bales should be allowed, but that the health of factory hands employed in handling it should be carefully supervised. I am of opinion that a case of plague among such hands, if immediately recognised, would present no more danger to the community than a case of cholera under similar circumstances.

Plague and animals.

No. 8.

Despatch from the Government of Bombay, to the Secretary of State, No. 28,
dated the 25th September 1897.

" We have the honour to acknowledge the receipt of your telegram, dated 18th March 1897, inquiring whether our advisers apprehend any risk of infection with plague poison of animal lymph prepared within plague areas, and if so, what precautions are being taken in the matter.

" 2. In reply we have to state that we have consulted the Surgeon-General and the Sanitary Commissioner. We have also availed ourselves of the expert opinions of Dr. J. A. Lowson, Plague Commissioner, and Mons. W. M. Haffkine, C.I.E., on the question whether cattle are liable to plague infection, and append copies of their reports for Your Lordship's information. The result of these inquiries goes, in our opinion, to establish that there is no appreciable risk of any plague infection from animal vaccine prepared with the precautions that have been observed. The grounds for this view may be stated as follows.

" 3. In the first place, the Sanitary and Medical Advisers of this Government consider that, even if theoretically there might be a risk of plague poison affecting animal lymph prepared within plague areas, yet in practice, owing to the strict antiseptic precautions observed in the preparations of the calf before inoculation and the care with which the lymph is collected and stored, the risk is reduced to a minimum. The calves are most carefully examined by skilled Veterinary Officers and none but the most healthy are used as 'Vaccinifers.' Great care is taken of them during the time they are developing vaccinia, and any sign of disease during this period is most carefully looked for. In fact the precautions taken render it almost impossible for anything, but the best lymph from absolutely healthy calves being taken.

" 4. This supposition is very strongly supported by the test of actual experience during the past year. In this Presidency vaccine lymph is prepared and sent out from only two centres, *vis.*, Bombay and Karachi, in both of which plague till lately existed in a highly epidemic form; and the Sanitary Commissioner reports, that, though numerous consignments of the lymph have been sent to various places since January last there has been no report or even suspicion of any case of plague having resulted from its use. Nor has there been any case in which a calf, either in Bombay or Karachi, has, after supplying lymph, developed plague. They have, on the contrary, all remained healthy.

" 5. It is in fact very doubtful whether cattle are susceptible to plague, at all events, to anything like the same degree as human

beings. There has been no record of any disease or deaths among cattle in the many places where the epidemic has raged in the Bombay Presidency which could be attributed to plague; and, as will be seen from Dr. Lowson's report, in Cutch-Mandvi inquiry has shown that cattle remained perfectly healthy, while the plague was at its worst in that town. The so-called cases of plague in cattle have, at least in one instance, been pronounced by competent veterinary opinion as renderpest. Dr. Lowson reports that he carried out experiments in Hong-kong in conjunction with the Colonial Veterinary Surgeon, in which it was proved that cattle, after direct inoculation with pure culture of plague bacilli, did not develop plague, and, with the exception of temporary fever and refusal of food, remained healthy. Moreover, plague bacilli could not be found microscopically or bacteriologically in their blood, nor were there any signs of plague, such as enlarged glands, along the chain of lymphatics from the spot where the inoculation was made. Mons. Haffkine's experiments in Bombay, like Dr. Lowson's in Hong-kong, tend to prove the immunity of cattle generally from plague. Mons. Haffkine injected hypodermically horses, goats, cows, and sheep with considerable doses of virulent plague cultures. The operation caused an attack of fever from which they all, except the goats, recovered in a short time with perhaps local swelling and suppurations at the seat of inoculation. The goats alone, without developing any acute disease, lost condition, gradually wasted away, and after a considerable time many of them succumbed. He further states that one of the cows gave birth to a calf during the period she was operated on, and both cow and calf remained healthy. Finally, Mons. Haffkine considers that his experiments show that no spontaneous plague infection, which in nature can take place with much smaller doses of virus than those used by him on horses, cows, goats, and sheep, is likely to affect these animals; and the Surgeon-General concurs in this opinion.

"6. Under these circumstances, we have come to the conclusion that there is no apparent reason to apprehend any risk of plague poison affecting animal lymph prepared with the special precautions taken in Bombay and Karachi."

**No. 9. Remarks on the Treatment of Bubonic Plague by
 James Cantlie, M.B.**

At first sight it would seem as though the treatment of plague was a subject which it is useless to discuss, as it is repeatedly stated

that we have no cure for plague. We have no "cure" for many, nay, most, of our diseases, yet experience has shown that, although no specific treatment is known, still with care, judicious nursing and medical supervision, ailments, such as typhoid, cholera, and zymotic diseases generally, can be, and are, conducted to a successful termination. Much therefore as it is desirable to know what will "cure" the disease, it is not consistent with our behaviour in other illnesses to stand by and wait-until it is discovered what form of attenuated virus may be tried as a specific remedy.

Once for all let it be understood that in no disease does one get such immediate results from careful and prompt medical treatment, and as a direct outcome of watchful nursing, as in plague; and perhaps one ought to add to that "in the case of Europeans."

Natives, whether of China or India, succumb more readily to plague than Europeans. There are one or two reasons for this: 1. A native seldom comes to a doctor (a European doctor most of all) until the disease is well advanced. 2. In point of stamina the poorer natives are a long way below northern Europeans. 3. The inherited dislike of the native for all forms of stimulants, be they medicinal or alcoholic, during illness. 4. The belief of the natives in the old adage that "to starve a fever" is correct. The difference between Europeans and natives was well illustrated, during the 1894 epidemic in Hong-kong, by the fact that out of 11 British patients, 9 recovered, a mortality of only 18·2 per cent.; whilst the Chinese died at the rate of something like 95 per cent. This favourable result cannot, however, be ascribed altogether to racial influence; it was rather due to the effect that medical treatment and good nursing had upon the course of the disease. The British patients were seen early in the disease. They could take, and stand, stimulants, medicinal and alcoholic well, and the result was the satisfactory number of recoveries which took place. Even with such Asiatics as would submit to similar treatment, most markedly in the case of the Japanese doctors, were the satisfactory results of treatment during plague manifest.

The attendance of the doctor must be prompt, and his treatment must be decisive. In fact, during the first five days of illness in plague, the doctor must be within a few minutes' call. To each ward of a hospital a doctor should be assigned, or, if a valuable life is at stake in a private house, medical aid must be obtainable in a few seconds. The changes are so rapid in plague, the feature of the disease so fulminant, that without immediate treatment being possible success is hopeless.

NURSING.

In a hospital ward, during the first five days of illness, practically two patients require an attendant to themselves if the utmost good possible is to be done. A nurse must never let her patient out of sight for a moment, be the patient asleep or awake. She cannot leave the ward or room, without posting a deputy, for any purpose whatever. No nurse should be on duty for more than eight hours at a time; still better is it to follow the four hours "watches" kept at sea.

The number of nurses required may seem outrageous, but we have in many illnesses a day and night nurse for private patients, and no more is demanded in this the most fatal illness known. Of course plague comes in epidemics, and the number of nurses is limited, no doubt; but we must not lose sight of what is necessary in considering what is expedient. Shortly, it may be put that a liberal supply of doctors and nurses is essential if the lives of the plague-stricken, be they native or European, are to be saved.

Enough has been said as to the rapidity of the onset, the development, and the fatality of plague to make the importance of early treatment in the disease and of the requisite promptness in its administration understood. The symptoms and signs change so rapidly, and in such varying successions, that no stereotyped line of treatment can be followed. Now it is delirium which calls for relief, now cardiac distress, or vomiting may supervene; or an unexpected loss of pulse, or a collapse totally without warning, may carry off the patient before any help is obtainable. The much despised legend, "Treat symptoms as they arise" is the maxim in plague, and if the word "promptly" were added, the summary of plague treatment is before us. The disease caused by a bacillus, the toxic effects of which upon the blood give rise to functional derangements of possibly all organs, but most markedly of the nervous system, central and peripheral. The poison is so acute that, with the exception of the glandular inflammation, but little structural change is met with in the more vital organs. The cardiac trouble which is so marked an accompaniment of the disease is evidently a functional one, and the result of derangement of the nervous supply of the heart. This has constantly to be borne in mind when the subject of drugs is dealt with.

The subject of segregation, temporary hospitals, quarantine, and disinfection generally, are not dealt with here. I propose merely to deal with general and medicinal treatment.

GENERAL TREATMENT.

The essentials are of free ventilation, a cool room (6° to 7° F. where such is possible), a plentiful supply of hot and cold water, ice, a sufficiency of servants, and, of course, all the appliances of a modern hospital. Deaths are so frequent and so sudden that when the hospital is large it is necessary to have men employed whose duty it is to remove, to disinfect, and to dispose of the dead.

Nothing should be allowed to leave the ward but to be disinfected. Crockery and glass should be scalded. Fæces should be sprinkled with quick-lime; bed and bedding if not burnt are to be disinfected by heat; the steam disinfector is well-nigh essential. Scrupulous cleanliness of the floor and bedsteads obtained by washing with a disinfectant solution are of primary importance, and all doorways should be curtained by a sheet wet with carbolic acid, Jeyes' or other reliable antiseptic.

The patient should not be allowed to get out of bed for any purpose, but the use of the bed pan and urine bottle should be insisted on. So many times has it occurred that the patient has tumbled over dead whilst getting up to stool, etc., that this is an imperative measure to insist upon.

MEDICAL TREATMENT.

Purgation.—When the patient is first seen, the foul state of the tongue, the foul breath, the jaundiced tinge of the conjunctivæ, and a generally bilious aspect, suggests a purge. For this purpose, calomel in 5-grain to 10-grain doses recommends itself. This is to be followed by a saline in some five hours' time. Against this treatment it may be argued that the drain upon the system and the lowering action of calomel are deleterious, but, if given quite early in the disease and not when the pulse is flagging, it undoubtedly seems to do good. It frequently stops vomiting, which is often present, it clears away the jaundiced aspect, it restores the power of taking nourishment, and it seems to diminish mental aberration and cardiac distress. If a full gall bladder justifies the exhibition of calomel, *post mortem* evidence of that condition is not wanting. So far as is known, bacilli of plague escape from the body in greatest numbers by the bowel. In the breath, sweat or urine bacilli are but sparsely met with, but in the fæces a rich supply is found. This points to the necessity of ample disinfection as being requisite for all latrines, bedpans, closets, etc., but it also proclaims as justifiable and rational the attempt to assist Nature in expelling the poison of plague by a free action of the bowels.

Stimulation.—From the very first onset, or certainly after twenty-four or forty-eight hours, it will be found necessary to stimulate the plague patient by food, by alcohol, or by medicine.

Food.—Unless the patient is actually delirious there is not usually much difficulty in feeding plague patients. In fact, in comparison with allied ailments, appetite is wonderfully good. One encourages this in a general way, but the occurrence of sudden death supervening after the ingestion of a full bowel of rice, for example, and its accompaniments, in the case of Chinese patients on several occasions, leads one to the belief that a full meal is not without its danger. The heart is in such a condition that it takes but little to disconcert its rhythm, and the pressure consequent upon a full stomach is calculated to do this. Food should be in small quantities, frequently repeated, and of a kind which is easily digested. Brand's essence of beef, in fluid or jelly form, is excellent, but any beef jelly will do. Ox-tail soup, mutton broth, beef and chicken tea, should be constantly on hand to suit the varying palate of the patient. Conjee water—that is the water in which rice is boiled—is useful as a drink and serves as nourishment. Milk with ice (sipped slowly), and ice cream (Lowson) are particularly grateful.

Drink.—Thirst is at times a marked symptom, and its relief should be attended to by allowing the patient anything in reason. Ice to suck, if not kept up too long; water or lemon and water (not lemonade) to drink, if not in such quantity as to distend the stomach; peer and stout iced, especially for Europeans, is "at once stimulant, soporific, nutritious, and thirst-quenching." (Lowson.) Brandy or whisky diluted with not more than three or four times its quantity of water (not aerated waters) should be freely supplied. When the pulse shows signs of falling, or collapse or faintness supervene, then of course alcohol is doubly beneficial, and brandy is preferable to whisky as a cardiac stimulant.

Delirium.—When active, the delirium of plague is best combated by cold to the head. Letter's coil would be perhaps the readiest method, provided the patient could be kept still, but an ice-bag or a constantly wetted cloth is efficient. These applications combined with tepid sponging of the body at frequent intervals seem grateful to the patient, are useful means of reducing temperature, and seem the safest and readiest method of quietening active delirium.

Hyoscine.—In most cases, but not in all, hyoscine administered hypodermically in doses of gr. $\frac{1}{10}$ is perhaps the most efficient and safe of the hypnotics. It calms the nervous system and induces sleep when everything else fails. Hyoscine should be one of the first drugs in the armamentarium of a plague hospital.

Morphine.—At times nothing but morphine administered hypodermically in doses of gr. $\frac{1}{4}$ to $\frac{1}{2}$ is of any avail. *A priori* one would not select it as a hypnotic or anodyne, but experience has proved it to be reliable, and not so unsafe as to exclude its use. It is almost certain that when painful adenitis complicates the cerebral intoxication, morphine effects its purpose. The safest method of administration is in combination with atropine.

Bromide of Potassium.—An occasional dose of bromide of potassium during delirium is useful and without danger, but its prolonged use is not permissible.

Diarrhœa.—An occasional looseness should not be stopped unless it continues over twelve hours, and the patient seems exhausted thereby. It is but seldom obstinate, and yields to salol in gr. x doses, or to an enema of starch and opium; or, still better, a suppository of morphine and cocaine, gr. $\frac{1}{4}$ and gr. $\frac{1}{4}$, respectively, more especially when continued straining persists. (Lowson.)

Vomiting frequently ushers in an attack of plague, and may persist throughout the illness. When the latter condition obtains, it is an unfavourable sign, as loss of strength ensues owing to the rejection of food and medicines. A mustard plaster to the epigastrium, ice to suck, and an effervescent draught of a few drops of hydrocyanic acid and liquor morphiæ are generally sufficient to check this untoward symptom. (Lowson.)

Pyrexia no doubt accounts for some of the delirium, the restlessness, the headache, and subsequent collapse. Hyperpyrexia is exceptional. The usual chemical antipyretics, antipyrin, and phenacetin are such severe depressants that they are at a discount and should not be used. Should hyperpyrexia necessitate its use, one hypodermic of antipyrin is no doubt justifiable, but only as a last resource. Frequent sponging with tepid water, ice to the head and nape of the neck, iced drinks, and a short application of the wet pack, with the administration of brandy by the mouth or by the rectum, are useful when promptly and rationally used.

Stimulants externally.—Flying blisters of mustard to the limbs, abdomen, and over the heart are useful. Sinelling-salts and strong ammonia applied to the nostrils often succeed in restoring the pulse, rousing the patient in collapse, and not infrequently cause him to rally from what seems a moribund state. (Lowson.) Nor is this kind of stimulation of mere passing effect, for in several instances, when death seemed inevitable and at hand, patients have revived and actually recovered permanently.

Stimulation by *hypodermic* injection of either is a treatment that gives grateful response, and must be used freely and frequently. The collapse from plague does not take place at that period of the disease when organic structures are played out, but it occurs early in the disease in two or three days, and is therefore more of a functional or toxic than of an organic nature; consequently, the use of stimulants, in whatever form, is more likely to be attended by remedial results and not by a mere temporary flicker of response.

Internally the form of drug most useful is either a general stimulant, such as ammonia, or a cardiac tonic or specific.

The prescription of every practitioner who treats plague will be found to be one in which carbonate of ammonia and the tincture or decoction of cinchona are met with, and with this mixture now given, now withheld, will be exhibited digitalis, strophanthus, or camphor. More good is ascribable to ammonia in some form than to any other known and more specific drug.

Digitalis in infusion, tincture or in leaf, the latter perhaps the best, seems the one drug called for when the pulse becomes dicrotic and the nervous stimulation of the heart gives out. In practice, however, it is unsatisfactory, and seldom can any good results be traced to its administration. No doubt the slowness of its action is against it; but, what is still more, positive evidence is against its being considered a reliable drug in an acute illness like plague.

Strophanthus is in the same category with digitalis.

Camphor in its double action as a direct cardiac stimulant and a stomachic carminative is useful as an alternative drug. Undoubtedly the best form is in pill in doses of gr. ii. Camphor may advantageously be used hypodermically dissolved in sterilised oil. *Caffeine* also is worthy of trial.

Musk, in the few cases treated therewith, seems to justify its administration, and it is a form of circulatory stimulant which one welcomes as an addition to one's resources. The musk, as fresh as can be obtained, may be given in 5-grain doses every six hours as an expedient.

Strychnine, administered by the mouth or hypodermically, is of the greatest use. Granted that functional abeyance of the nervous influence, more especially of the heart, is the essence of the toxic effect of the plague bacillus, strychnine ought to be a drug of importance in the treatment. This expectation was borne out in practice, and Dr. Lawson in his report, and all who have reported on the treatment of plague, regard strychnine as a most reliable agent in the form of

stimulation required in plague. Liquor strychninæ in 5 to 10 minim doses, given every four hours, is the most convenient form; but, when vomiting is present, a hypodermic solution of gr. $\frac{1}{8}$ of the sulphate of strychnine in 10 minims of distilled water is advisable.

Other drugs may be mentioned, but, though useful as a change and a standby on occasions, they do not justify more than a passing notice. Among the more important are *quinine* when malaria complicates the disease, as evidenced by a large spleen; *aconite* in the early stages, when high fever and a full pulse are present; *chloride of ammonium* as an alternative is occasionally useful.

The inhalation of oxygen (Lowson) is not to be neglected, and the gas ought to be always at hand and ready for immediate use.

The result of experience gained by local, radical or tentative *treatment of the glands* does not lead one to expect much benefit from them. That abscesses should be opened when they point, or when fluctuation is perceptible, is of course natural; but that local remedial steps should be undertaken for the purpose of affecting the course of the disease by acting on the gland is, from what we know of the pathology of the disease, scarcely rational. Injection of a swollen gland when it is accessible, as in the groin, with such substances as carbolic acid, perchloride of mercury, or a solution of the perchloride of mercury and iodide of potassium, has perhaps a theoretical basis of justification, but practically little good can be ascribed to it. The latter-mentioned solution may have a higher claim, as in several cases in which it has been administered, temperature falls and the patient seems easier. It may be, however, that the mere pricking of the tense capsule of the gland even by needle punctures may serve to relieve tension and thereby pain. This leads one to the belief that subcutaneous incision of the gland may be attended with beneficial results, and it is a method of surgical procedure not without precedent. Early free incision of the gland is not to be recommended, nor can excision be in any way justified. The disease is a polyadenitis and of so extensive a nature that eradication of infected glands is an impossibility. A gland, when swollen, red and painful, may be smeared with glycerine and belladonna, or poulticed to relieve pain, and, when fluctuation is perceptible, it should be opened, but further procedure is useless. When pus is evacuated, dusting the wound with iodoform and insuring thorough drainage are the means by which the best results are obtainable.

Retention of urine, a frequent concomitant during the delirium of plague, renders the use of the catheter imperative.

Reports by M. Haffkine on experiments made with Curative Serum.

No. 10.

Dated Bombay, the 17th February 1897.

From—M. W. M. HAFKINE,

To—The Secretary to the Government of India, Home Department.

I have the honour to communicate the following information on the attempt at curative treatment, which has been made by means of the antitoxine at present under preparation here at Sivree during the outbreak of plague in Byculla Jail.

A patient called Ganoo Baloo admitted to the hospital since three days has received one injection of antitoxine, but died within eleven hours.

The following patients were selected for treatment immediately after their admission to the isolation shed, though after some time has elapsed since the onset of the disease.

Admissions on the 30th January 1897.

Of six patients admitted in the morning, the two most serious, Jeeva Virchand and Syed Jonas Ali, were selected for the antitoxic injection, the four milder left to the ordinary treatment.

Of the four milder, three have died within two, four and six days. The two others specially treated have survived.

Admissions on the 31st January 1897.

Of the two cases admitted, the most serious one, Anuah Vishrao, has been selected for the special injection, the other milder has been left to the ordinary treatment.

The milder case ended fatally after three days' illness; Anuah Vishrao is alive.

Admissions on the 1st February 1897.

Of the five cases admitted, the two most serious, Kaloo Bhimsha and Keshoo Umar, have been selected for the antitoxic injections; the three milder left to ordinary treatment.

The two treated cases have ended fatally after six and twelve days' illness; of the not treated specially, two died after four and nine days.

II. Analysing the result in connection with the period elapsed between the onset of the attack and the beginning of the antitoxic treatment, it appears that—

- out of the six patients treated, four have been taken for the special injection within twenty-four hours after the attack and two patients after two and three days' illness.

Of the four patients admitted for treatment within twenty-four hours, three have survived and one lived for twelve days.

The two admitted three and two days after attack have died eleven hours and four days after beginning of treatment.

I believe from the above results that there is the possibility of the antitoxic serum rendering service in the treatment of the disease.

At the present stage of the preparation for producing any marked effect on the disease, the following restrictions impose themselves: it is necessary to start the treatment within the first twenty-four hours, and a large number of repeated injections are required.

The possibility remains that, with the further maturation of the fluid, its power will increase so as to effect an influence on older cases and when used in smaller doses.

No serum can as yet be issued for the use of the general public.

Dated Bombay, the 14th July 1897.

No. II.

From—MONS. W. M. HAFKINE, C.I.E.,

To—The Secretary to the Government of India, Home Department.

I have the honour to forward the following information regarding the operations pursued by me at the Government Lazaretto at Sivree, near Bombay. These operations were intended for the trial of an antitoxic serum treatment in plague, on lines similar to those worked out in diphtheria. The information which had been published about the beginning of the epidemic here regarding the Amoy experiments of Dr. Yersin had created the expectation that the principle, which in diphtheria had effected the reduction of mortality to about half of its usual extent, will give in plague an infinitely higher amount of success, reducing the case mortality from about 90 per cent. to 7. It was in this expectation, and while I was making tentative experiments in that direction, that I adopted the suggestion made to me by the Health Department here, to start the manufacturing of antitoxic serum, which requires long months of preparation, at a large scale at once.

In a couple of months a considerable number of the treated animals have been brought to a high degree of immunity, and their serum, when tried on infected animals, was found to arrest the development of the disease in them.

At this stage of preparation, and while I had still a limited amount of serum, I attempted, on several occasions, the application of the treatment to human patients. I chose for that purpose individuals

in whom the severity of the disease did not leave hope of its yielding to the ordinary treatment, expecting that the drug will manifest its power by assisting the physician in such cases.

On no stage of my efforts could I obtain any clear results to that effect.

I have then resolved to prepare, for the trial of this treatment, a large amount of serum which would be tested in the same manner as it was done in the case of diphtheria, namely, by its application to a very large number of cases, severe and mild, and by comparing the mortality amongst these with the mortality amongst a similar group of patients not so treated. For there remains the possibility of the therapeutic serum, without producing a clear effect in every case, influencing, however, the general mortality to an appreciable extent similar to the result in diphtheria.

The preparation of the antidiphtheritic serum requires the treatment of animals for a period from four to six months. In the case of plague Dr. Yersin stated that the preparation takes him about six months. In Bombay, where in the beginning neither laboratory accommodation nor the necessary staff was prepared for this kind of work, and while the largest part of our time was absorbed by investigation and when the prophylactic treatment was worked out by its application and trial, the present epidemic was over before the above plan could be carried out.

I have got now at Sivree a number of animals in a high degree of immunity. These animals can yield at once an amount of serum sufficient for many hundreds of patients; and afterwards this amount can be obtained from them time after time again, the animals remaining as strong and sound and fit for work as they were before the treatment.

Reckoning upon the final expiration of the epidemic, these animals can be sold off at once.

Should, however, a recrudescence of plague occur during the next season, and if the serum now accumulated and tried on the plan above mentioned show any favourable effect, the loss of these animals, possessing a power which it has taken many months to be created in them, may have to be regretted.

I am therefore proposing now, in a letter to the Commissioner for the City of Bombay, that the staff at Sivree should be maintained by the Municipality for another two months. In case the plague does not re-appear in Bombay and does not develop in any part of India, the animals should be sold off, and the serum now obtainable from them stored up.

On the other hand, if the plague has left Bombay definitely, but still lingers on in the country, I should then address Government asking them whether they would not take over the Sivree establishment and maintain it at their cost, till the plan of antitoxic treatment in this disease is given a complete trial.

2. My laboratory on the Malabar Hill is at present engaged in further investigation of the problem of prophylactic treatment and in the storing up of the prophylactic material matured during the last months.

Reports by M. Haffkine and Dr. Lyons on experiments with Prophylactic Serum.

Dated Bombay, the 16th January 1897.

No. 12.

From—MONS. W. M. HAFKINE, C.I.E.,

To—The Secretary to the Government of India, Home Department.

I have the honour to communicate the following facts relating to the possibility of protective inoculation against the plague.

In the course of the present researches I have found different media which give rich cultures of the plague bacillus, permitting to cultivate them in abundant and concentrated quantities.

The virulence of these cultures is shown by the fact that 1 or 2 minims are sufficient to communicate certain death to the largest rodents.

The destruction of the bacilli in the culture by delicate processes, such like the addition of essence of mustard, of very weak solutions of carbolic acid, or by desiccation, or by heat, deprives these cultures of their fatal properties, and makes a dose 40 to 50 times bigger than the fatal one, quite harmless to the animals.

But, while depriving the cultures of their noxious properties, the above processes leave to them the powers of protecting the system against fatal infection.

Rodents which have had an injection of such cultures (with microbes killed in them), when infected five days after the prophylactic treatment, stand easily a dose of virus which would be fatal to ten other non-protected animals.

Having established these facts, I caused myself to be inoculated on the 10th of this month to observe the symptoms of the operation in man.

The injection was done in the flanks with 10 cubic centimetres of a culture in which the microbes were killed by heating during one hour at a temperature of 70° C.

The symptoms produced consisted in pain at the seat of inoculation and in a rise of temperature. The highest point reached was 102° F., 8 hours after the injection, which was accompanied by slight headache and feeling of faintness. The temperature got again normal 24 hours later. The bowels remained normal.

The pain at the seats of inoculation was mostly felt next morning while getting up from bed. It extended, on the left side, to the region above the Poupart's ligament and on the right, towards the axilla, without reaching it.

Since the next day the pain gradually disappeared. A small nodule remained afterwards at the seat of inoculation, but got rapidly absorbed. These symptoms show that the operation is perfectly harmless to men.

These observations made in the laboratory lead to the conclusion that the inoculation, as described above, will increase the resistance of man against the disease. But the extent of that protection, and the modifications to be introduced in the method for the object of increasing that protection, can be shown only by observation on man during the epidemic.

The most important facts to be solved by such observations are the following:—

- (1) Which are the doses necessary to produce in man a marked increase of resistance against the conditions of infection as they exist in nature?
- (2) How many days after the injection is the highest resistance reached?
- (3) How long will the resistance last?

No. 13.

Dated Bombay, the 16th February 1897.

From—MONS. W. M. HAFFKINE, C.I.E.,

To—The Secretary to the Government of India, Home Department.

In view of the urgency of the case, I have the honour to communicate the following information concerning the outbreak of plague in Her Majesty's House of Correction, Byculla, where a considerable portion of inmates had volunteered to undergo the prophylactic treatment, and where the first observations on the effect of this treatment have been collected.

Between the 23rd and 29th of January last nine cases of plague have occurred in the jail, of which five proved fatal, the population at the beginning of the outbreak numbering 345 souls.

The prophylactic treatment has been applied on the 30th January 154 of a total 337 volunteering to be inoculated.

Occurrences on the day of inoculation.

In the forenoon of the day of inoculation six new patients have been admitted to the hospital suffering from plague; of these, three proved fatal.

The inoculations were applied in the afternoon. One of the inoculated, Keshav Uma Shankar, prisoner No. 672, had at the time of inoculation a painful gland in the left groin; two others, Abdool Karim, No. 1356, and Govind Pandoo, No. 1222, developed painful glands in the left axilla the same evening. These three cases have also proved fatal.

On the first day after inoculation there were—

Amongst 177 not inoculated prisoners, two cases, of which one proved fatal.

Amongst 151 inoculated, one case, who rapidly improved and recovered.

On the second day after inoculation there were—

Amongst 172 non-inoculated, one case, which proved fatal.

Amongst the inoculated, *nil*.

On the third day after inoculation there were—

Amongst 173 non-inoculated, one case, which proved fatal.

Amongst the inoculated, *nil*.

On the fifth day after inoculation there were—

Amongst 171 non-inoculated, one case, which proved fatal.

Amongst 146 inoculated, *nil*.

On the sixth day after inoculation there were—

Amongst 169 non-inoculated, one case, which proved fatal.

Amongst the inoculated, *nil*.

On the seventh day after inoculation there were—

Amongst the 169 non-inoculated, five cases, of which one proved fatal.

Amongst 146 inoculated, one case, who is alive.

Since the 6th instant no more cases have occurred in the jail.

The following is a tabulated form of occurrences.

Date of occurrences.	Amongst the non-inoculated.	Amongst the inoculated.
23rd to 26th January 1897 ...	9 cases, 5 fatal ...	.....
Forenoon before inoculation	6 " 3 "	.....
Afternoon after inoculation	.....	3 cases fatal.
First day after inoculation, 31st January 1897.	2 cases, 1 fatal ...	1 case.
Second day after inoculation, 1st February 1897.	1 case fatal ...	.....
Third day after inoculation, 2nd February 1897.	1 " " ...	.....
Fifth day after inoculation, 4th February 1897.	1 " " ...	.....
Sixth day after inoculation, 5th February 1897.	2 cases, 1 fatal ...	.....
Seventh day after inoculation, 6th February 1897.	5 " 1 " ...	1 case.
Total after day of inoculation ...	12 cases, 6 fatal, in an average daily strength of 173 non-inoculated.	2 cases in an average daily strength of 148 inoculated.

The experience gained by the observation in this jail tends to show—

First.—That the injection of 3 ccm. of the prophylactic seems to be sufficient to effect the desired protection, no repetition of inoculation being necessary to arrest the disease during an existing epidemic.

Second.—That the prophylactic is powerless to arrest the symptoms of plague already started, or which develop within a few hours, but there is the possibility of its influencing the disease in the incubation period in individuals infected three or four days previously.

Third.—That the time necessary for the plague prophylactic to produce the protective effect is shorter than in any preventive treatment known, this period being in the anti-cholera inoculation of four days, in vaccination against small-pox of seven days, in the inoculation against anthrax of twelve days, in the inoculation against rabies of fifteen days, and in the present treatment, apparently less than one day.

Fourth.—The question remains open as to how long will the inoculated persons remain proof against the disease, and therefore, in order to ensure the probability of a more lasting effect, it is advisable to apply repeated inoculations with doses higher than the above-mentioned.

The above conclusions are temporary and refer only to the teaching of the particular outbreak in question. There remains fully the possibility of the future experience compelling us to modify the above conclusions, though the expectation is justifiable that the general bearing of the results as above detailed will remain unshaken.

A copy of this letter forwarded to the Municipal Commissioner for the City of Bombay.

Dated Bombay, the 14th July 1897.

No. 14.

From—MONS. W. M. HAFKINE, C.I.E.,

To—The Secretary to the Government of India, Home Department.

I have the honour to forward herewith a summarised report on the experiment of preventive inoculation against plague made upon 7,905 persons in Bombay between the 10th of January and 10th of July 1897.

This report does not include the occurrences in Her Majesty's House of Correction, Byculla, which have been reported,—comparatively with the occurrences amongst the non-inoculated present in the jail during the outbreak,—in my letter, dated Bombay, 15th February 1897.

A report on the experiment of preventive inoculation against plague made in Damán upon 2,001 persons between the 23rd of March and the beginning of June 1897 will be forwarded to you directly after this.

A copy of the present report has been sent to the Municipal Commissioner for the City of Bombay.

Summarised report on the experiment of Preventive inoculation against plague made on 7,905 persons in Bombay between the 10th of January and 10th of July 1897.

The following number of persons has been inoculated against the plague at the different inoculation stations in Bombay:—

At the Petit Laboratory, Jamsetji Jijeebhoy Hospital, } or by the Medical Officers deputed from there. }	...	5,104
At H. H. Agakhan's Bungalow, Love Lane	...	1,844
At the St. George's Hospital	...	198
At the Gokul Das Tejpal Hospital	...	31
Inoculations performed at private hours—		
By Surgeon-Major Dimmock upon	...	46 persons.
„ Surgeon-Captain Childe	...	136 „
„ Dr. McCamie Dallas	...	215 „
„ Dr. K. S. Engineer	...	70 „
„ Dr. Murphy	...	87 „
„ Dr. Kalapesi	...	148 „
„ Dr. Trilokekar	...	26 „
Total		7,905 „

A detailed report on the inoculated, classified according to races and occupation, will be sent in later on.

2. The following occurrences of plague took place amongst the inoculated in Bombay.

I.—Fatal Cases.

1. Serabjee Naorojee Daruwalla, Parsee, male, 20 years, reported to have developed plague within about 12 hours after inoculation, but likely to have been already unwell when inoculated; died on the fourth day.

2. Luxman Shivram Kharkar, Hindu, male, 35 years, pleader from Thana, came for inoculation after feeling first plague like symptoms inoculated on the 20th March 1897; died on 21st night.

II.—Attacks ending in Recovery.

1. Kondem Dussara, daughter of Surgeon Major Dimmock's coachman, Hindu, 11 years, attacked with plague 12 days after inoculation; recovered.

2. Aboo Chima, Surgeon-Major Dimmock's dhobi, attacked with plague 17 days after inoculation; recovered.

3. Gulam Hussein Mahamad, Mahomedan, male, 37 years, developed gland and fever on fourth day after inoculation; symptoms disappeared within a week.

4. Girzai, Hindu, female, 25 years, contracted plague 6 days after inoculation; recovered in a few days.

5. Jokhan Pubber, Hindu, male servant of Brigade-Surgeon-Lieutenant-Colonel Arnott, attacked with plague next day after inoculation and sent to hospital; recovered.

6. Ganoo, Hindu, male, 20 years, a mali of Surgeon-Lieutenant-Colonel Hatch, attacked 12 days after inoculation; recovered.

7. Narayan Munglia, Koloe, Hindu, male, 8 years, from Mora, attacked 17 days after inoculation; improved from the next day; recovered.

8. Toolja Munglia, Hindu, female, 25 years, from Mora, attacked a fortnight after inoculation; improved from third day; recovered.

9. Mr. Naronha, Christian, 29½ years, Assistant Superintendent, Public Works Department, Bombay, attacked one month after inoculation. Fever came down on the fourth day of the attack and patient recovered.

10. Jeevraj Poonja, Khoja, Mahomedan, male, 30 years, attacked on the day of inoculation; recovered.

11. Eduljee Hormusjee Jamoola, Parsee, male, 11 years, of Mora, attacked 15 days after inoculation ; improved after two days' illness ; bubo disappeared after a week.

12. Ardesir Jijibhoy, Parsee, male, 10 years, attacked on the fifth day after inoculation ; recovered.

13. Pherozsha Burjorji, Mistri, Parsee, male, 20 years, reported to have had two attacks of plague before inoculation, one severe, the second milder. Third attack followed five weeks after inoculation ; fever disappeared after one day, gland remaining for several days longer ; patient recovered.

14. Ahilya Anant, Hindu, female, 7 years, from Sion, developed gland and fever three months after inoculation ; improved from next day ; recovered.

15. Ardesir Pestonji Baria, Parsee, male, 48 years, from Mora, attacked one month after inoculation ; improved and recovered after three days' illness.

16. Raoji Bhana, Hindu, male, 16 years, attacked 16 days after inoculation ; sent to the Charing Road Hospital in fever with a swollen gland. Fever disappeared in four days, gland lasted longer, but gradually disappeared.

III.—A case of death from cause other than plague following soon after inoculation.

Anant Bhikaji Paranjpe, Brahmin, 40 years, teacher from Bandra-got, an attack of hemiplegia two days after inoculation and died on eleventh day. The result of the medical investigation was to the effect that the attack was unconnected with plague, nor with the inoculation.

Summary.

Amongst the 7,905 persons inoculated in Bombay during the epidemic, and who all came from the most threatened localities and houses, there were (besides the occurrences in the Byculla House of Correction described apart) —

(a) *two* persons who were already unwell at the time of inoculation, and who developed unmistakable plague within the next 12 hours ; they eventually succumbed ;

(b) and *16* persons who were attacked more than 12 hours after inoculation, and all recovered.

These results are in perfect conformity with those observed in the Byculla Jail mentioned above. No other casualties of plague amongst the inoculated have been reported, though a large number of physicians watched the results with eager interest and many with great readiness for criticism.

I am specially confident with regard to the number of fatal cases reported, whereas in the number of cases with recovery there may have been neglect in reporting some of them, as a large proportion of the cases were exceedingly mild. The increase, however, in the number of cases *ending in recovery* would put in a still more satisfactory light the small case mortality amongst the inoculated—a problem which was particularly aimed at in the plan of preventive inoculation worked out for the plague, as contrasted with the inoculations against cholera.

In the latter case no reduction in the proportion of deaths to cases could be established in any of the outbreaks where inoculation was applied, though a reduction in the absolute mortality was unmistakably observed in all the most important cases of observation.

The result of the inoculations against plague, as far as known for the present, would therefore justify the adoption of a similar modification in the plan of all the future methods of preventive treatment, including the inoculations against enteric, intended to be introduced now amongst the troops in India.

(c) Finally, there was one case only where, for a short time, a question arose whether the plague inoculation did not do any harm. The case appeared, however, to be in no connection with plague nor with the inoculation, as the disease, an attack of hemiplegia, has not been observed either in plague or in any other of the inoculated individuals.

No. 15.

Dated Hardwar, the 20th November 1897.

From—MONS. W. M. HAFFKINE, C.I.E.,

To—The Secretary to the Government of India, Home Department.

I have the honour to submit a report, by Surgeon-Major Lyons and myself, on the epidemic of plague in Lower Damaun and on the effect of preventive inoculation there. .

The delay in forwarding this report was due to the fact that, while the observations collected in Damán were being studied and classified, two epidemics occurred, one after another, in Lanowlie and in Kirkee, in conditions which permitted of making a very accurate investigation on the effect of inoculation. I decided to delay the preparation of the present report, and to take immediate advantage of the two outbreaks, for repeating the experiments made in Damán,

and verifying, for a second and for a third time, the results obtained in the former place.

In both epidemics just referred to, as will be seen from the reports to follow, the results were slightly below those obtained in Damán, which was due to my having been unable, while away in the affected districts, to renew the stock of lymph stored up in Bombay, and to my having had to use material of (gradually) inferior quality, when the stronger was exhausted. The effect differed, however, inconsiderably, and represented, in Damán, as will be seen from the adjoined report, a reduction of 89·2 per cent. of the plague mortality, in Lanowlie a reduction of 85·7 per cent., and in Kirkee of 77·9 per cent.

2. I beg, Sir, to point out, in the submitted report, the following features: the great readiness and spontaneity with which the population came forward for inoculation, without any pressure being brought to bear upon them, except that of the dreaded disease; the rapidity with which the effect of the treatment was perceived and appreciated, and the fact that one assistant, deputed to the place, was able to inoculate, in a few days, large numbers of people, the inhabitants providing all the necessary accommodation and help. When compared with the circumstances connected with the attempts at destroying the bacilli of plague in villages and in big towns, and at keeping the sick and the healthy away from each other, and from the infected localities, the method of combating the epidemic by inoculation presents inestimable facilities.

3. I shall submit my full reports on the operations in Lanowlie and Kirkee—in order to confirm the conviction which imposes itself on studying the Damán epidemic—as early as my present absence from my office, and the time required for compiling the documents, will allow me. In view, however, of the great urgency of the case, I believe it opportune to consider, from the present, the possibility of Government deciding to introduce preventive inoculation as a means of combating the plague, on lines similar to vaccination,—combining this method, in the commencement, with other measures, but assigning to it, in the programme, a very important part. I give, therefore below a brief sketch of the organisation necessary for that:—

(a) The staff sufficient for securing a supply of lymph for India would consist of—

one Commissioned Medical Officer, as a permanent assistant, who will be trained to carry out and supervise all the Laboratory preparations connected with the plague prophylactic;

one Military Assistant Surgeon;

one Apothecary ;
one Clerk ;
two Laboratory boys ;
one peon for packing and despatching of parcels ; and
one Hamal.

I suppose, of course, that the above staff will be free from any work connected with the actual inoculations, or from any investigation duty, and will devote undividedly their whole time to the manufacturing of lymph.

- (b) The raw materials necessary for the preparation of one hundred doses of lymph cost below Re. 1.
- (c) In case the Laboratory remains in Bombay, a house for its accommodation, containing 30 rooms, provided with gas and water, with an extensive compound and several out-houses and stables, is placed at our disposal, free of charge, by His Highness Aga Khan, in a suitable locality of Bombay. If the Laboratory is located elsewhere, accommodation will be required of ten rooms, for the preparation and storing up of the plague prophylactic, and of another half dozen rooms for carrying on investigation work.
- (d) The actual inoculation should be carried on by the flying columns, or parties at present engaged in combating the plague in the affected districts, and which, with regard to the inoculations, should be subject to the same regulations as are in force for vaccination against small-pox. It is desirable that, in the beginning, in every new place, the inoculations should be started by a Commissioned Medical Officer, whom I shall guide personally in his first set of operations, and whose duty it should be to keep my office informed on the effect produced upon the epidemic. Afterwards, and very soon, the operations will be entrusted to an Assistant Surgeon or a Hospital Assistant.

4. I propose, unless you advise me to the contrary, to remain in Hardwar for the time necessary for ascertaining whether the disease contracted by the monkeys, and which caused only an insignificant mortality among them, is the same as the bubonic plague in men ; and to return to Bombay after that.

Joint Report on the Epidemic of Plague in Lower Damaun, Portuguese India, and on the effect of Preventive Inoculation there, by M. Haffkine and Surgeon-Major Lyons.

The plague prophylactic referred to in the present report has been described by Mons. W. M. Haffkine in the "British Medical Journal," May 1897, and in the "Indian Medical Gazette," June 1897.

The facts reported here have been collected by Professors Koch and Gaffky, the heads of the German Scientific Mission to Bombay, and Mons. Haffkine, on a visit to Damaun on the 20th and 21st May last; at the end of the same month a house-to-house visitation at Damaun was undertaken and carried out, at Mons. Haffkine's request, by Surgeon-Major Lyons, President of the Bubonic Plague Research Committee, in order to complete, by exact details, the information gathered on the first visit.

At the German Scientists and Mons. Haffkine's inquiry at Damaun, their informants were—

His Excellency Colonel J. P. Kuchenbuck Villar, Governor of Damaun;

Mr. Judge, Assistant Collector, Salt and Revenue Department, in charge of the Preventive Police and the Plague Operations on the Damaun Frontier;

Shet Sorabjee Manockjee Damaunwalla, head of the Parsee Community, assisted by his Secretary;

Dr. Virgilio Poiarés, Physician in charge of the Plague Hospital;

Dr. Proença, Health Officer;

Dr. Pinto, in charge of the Plague Operations in Damaun Town; and

Dr. Da Cunha, L.R.C.P. (Edinburgh),	} Medical Practitioners of Damaun.
Dr. Moniz, L.M.S., and	
Dr. Fernandez,	

The Medical Officers abovementioned were assembled, on the 20th May 1897, by His Excellency the Governor, who was also present, and to whom we are indebted for affording every facility for making the enquiry complete. The general information given below, in the preliminary part of this report, was reported at this meeting and was supplemented by documents from the respective offices.

The history of the Damaun epidemic appears to be as follows:—

The town of Damaun is divided by a river into two parts: Lower Damaun, the largest business part of the town; and the Fort, or Upper Damaun, where the Government house and the Government offices are situated. The plague attacked almost exclusively three of the villages which make part of Lower Damaun, namely, Lower Damaun proper, having, in ordinary times, a population of 5,000 inhabitants; Katheria, the property of Shet Sorabjee Damaunwalla, with a population of 4,700; and Khadiwadi, with a population of 1,200. This part of the town was in active business communication with the Bombay Presidency, and is densely populated, the inhabitants living in small houses crowded together. The Fort was cut off by a cordon from Lower Damaun as soon as the epidemic began to increase in proportion, and had only some $\frac{1}{2}$ dozen imported cases.

The first attacks came to notice in February last, and occurred amongst new arrivals from Bulsar, a neighbouring town which was badly affected at the time, and amongst sailors from Karrachee arriving at Damaun by sea, in native crafts. Before the end of the same month local cases began to appear among the fishermen, who have their *busti* close to the river, where crafts are moored, behind the Damaun Municipal School. In the last days of the month a hurried exodus of people began from Lower Damaun, increasing daily as the epidemic gained in intensity, until, on the 23rd of March, the Governor placed a cordon along the river, and stopped communication between the Lower and Upper parts of the town; while a week later, on the 30th March, the Bombay Government, on their part, closed British territory to the inhabitants of Damaun. By this time, it was estimated, over 2,000 people had quitted the place.

The worst period of the epidemic corresponded to the month following the closing of the Damaun frontiers. The climax was reached in the middle of April, when the daily number of deaths remained stationary for about 8 days and then began to decline. The largest number of deaths which occurred in one day was 80.

Up to the 25th of April the daily mortality, which was closely watched by the Parsee Community who kept peons on the burial and burning grounds, was recorded officially from the information given by the inhabitants coming to the Registration Office to declare cases of deaths in their families. On the 25th April, the Governor placed a guard of his own on the burial and burning grounds, and on that day, though the number of deaths reported by the inhabitants was 11, the number of bodies disposed of in the presence of the guard was 34. From the above date the Governor's guard was kept permanently on

the grounds, and the official information became complete. The following is the number of bodies registered by this means from the 25th April up to the date of investigation :—

25th April 1897	...	...	...	...	34
26th "	...	...	...	...	31
27th "	...	...	...	...	21
28th "	...	...	...	...	49
29th "	...	...	...	...	41
30th "	...	...	...	...	58
1st May 1897	...	...	...	...	41
2nd "	...	...	...	...	22
3rd "	...	...	...	...	29
4th "	...	...	...	...	47
5th "	...	...	...	...	33
6th "	...	...	...	...	31
7th "	...	...	...	...	31
8th "	...	...	...	...	33
9th "	...	...	...	...	18
10th "	...	...	...	...	24
11th "	...	...	...	...	27
12th "	...	...	...	...	15
13th "	...	...	...	...	13
14th "	...	...	...	...	17
15th "	...	...	...	...	13
16th "	...	...	...	...	20
17th "	...	...	...	...	6
18th "	...	...	...	...	8
19th "	...	...	...	...	13
<hr/> 25 days.					<hr/> 675 deaths.

Thus, during the 25 days preceding our visit, *i.e.*, between the 25th April and 19th May 1897, at a time when the population was considerably thinned by desertion and death, and when the mortality had dropped to 8 and 6 a day, the total number of bodies disposed of was 675, giving an average of *25 deaths a day*. His Excellency the Governor and the medical gentlemen present at the meeting stated that they would be well within the real figure if they estimated the number of deaths which occurred in the fully populated town, in the first period and during the height of the epidemic, *i.e.*, up to the time of placing the guard, at an average of *30 a day*, counting from the 1st March and neglecting the mortality before that date. This estimate gives a total of 2,325 deaths as having occurred in Damaun from the beginning of the epidemic up to the time of the Scientific Committee's visit. Of this number, 2,093 deaths were afterwards authenticated in the particular families where they had

taken place, during a house-to-house enquiry instituted by Shet Sorabjee Damaunwalla, the owner of Katheria.*

• As the immunity of the inoculated in Damaun will be estimated from a comparison with the mortality in the uninoculated population, it is essential, in order to avoid the possibility of exaggerating the power of inoculation, to take for guidance the lowest figure admissible as representing the real death-rate in the place. In the following calculations, therefore, the number of deaths from plague which occurred in Damaun from the commencement of the epidemic up to the visit of the Scientific Committee is accepted as 2,093, which is the number authenticated by an enquiry in each of the affected families. This figure gives an average daily mortality from the commencement of the epidemic up to the time of placing guards on the burial and burning grounds, as being close upon 26 deaths a day. From the 21st of May up to the end of the same month, that is to say, up to the date when Surgeon-Major Lyons concluded the additional inquiry, of which the details are given below, there occurred 96 deaths more, giving a total of 2,189 deaths from plague which took place in Damaun during the period under observation.

In this number of deaths there were 24 in those inoculated, personally observed by the Medical Officers of the place; *plus* a small number of others of which they knew, but which they had not seen personally. 15 deaths of the 24 were reported by Dr. Moniz, who was said to have treated the largest number of plague patients in the place; 4 by Dr. Poiares, who also saw 4 other cases which recovered; 3 cases by Dr. Proença, all of whom recovered (these had been seen also by Dr. DaCunha); 3 deaths were known to Dr. DaCunha,

* The number of deaths from plague which took place during the *whole* epidemic up to the end of July, and a record of which could be obtained by an enquiry in the households, was 2,352 and was distributed amongst the different castes inhabiting Damaun as follows:—

Parsees	...	...	6	Ghatis	...	...	21
Brahmins	...	...	26	Potters	...	...	16
Parbhus	...	...	4	Portuguese	...	...	34
Shrawaks	...	...	11	Bandarees	...	...	22
Banias	...	...	23	Bhayas	...	...	5
Lohanas	...	...	4	Bhateli	...	...	1
Gujrathi Goldsmiths	...	...	15	Dhobias	...	...	16
Daxini Goldsmiths	...	...	80	Mochis	...	...	23
Hindu Barbera	...	...	27	Kolis	...	...	19
Khatris	...	...	87	Boras	...	...	5
Coppersmiths	...	...	11	Khojas	...	...	4
Machis	...	...	600	Lohars	...	...	13
Carpenters	...	...	104	Mangelas	...	...	7
Mussalmans	...	...	440	Hindoo Low Castes	...	...	351
Golas	...	...	106	Castes unknown	...	...	200
Chhipas	...	...	23				
Tailors	...	...	48				
				TOTAL	...	...	2,352

and 2 to Dr. Pinto (in addition to one mentioned by Dr. Moniz which Dr. Pinto had seen with him).

Considering the small extent of the town, the limited number of inhabitants, and the number of Medical Officers who were looking after the place, it appeared probable that not many attacks among the inoculated escaped their notice, as such attacks usually excite much comment amongst the inhabitants, and attract general attention. Indeed, the gentlemen present at the meeting seemed to know between them every place in the town where inoculated people lived, and every house which had suffered from plague or happened to have escaped. As has been mentioned already, they stated at the time that there was a small number of inoculated attacked whom they did not see, but of whom, they informed us, a record existed in the office of Shet Sorabjee Damaunwalla, where, during the plague, a dispensary was opened for distributing gratuitous medicines to the affected population.

It was on the initiative of that Parsee gentleman that the inoculations were introduced. He had a personal knowledge of the people who were inoculated, and kept a watch over the effect of the operation, collecting, with the help of his office establishment, a large number of details in this connection.

From his information it appeared that the total number of deaths amongst the inoculated was under 40, each of the cases being known to him; that amongst those inoculated in a first series of inoculation, done in March last, a smaller proportion got affected and died than amongst those done a month later; and that in a series of inoculations carried out by the Physician in charge of the Damaun Plague Hospital, with lymph supplied from our Bombay Laboratory, the number of attacks was larger than amongst those inoculated by Dr. Kalapesi, Dr. Haffkine's assistant, sent from the Laboratory. These details were found afterwards, in the course of the close investigation carried out by us, to be scrupulously correct.

Mr. Sorabjee had also a guard of his own kept on the burial and burning grounds watching the course of the mortality, and his information concurred with the statements recorded above. The number of people inoculated up to the time of the Scientific Committee's visit was 1,645: over four times that number remained uninoculated. The latter had lost from plague close upon one-third of their number, and, he considered, there could be no doubt that the inoculated exhibited a most striking degree of immunity.

The effects of inoculation were closely watched by the inhabitants, as will be seen from the following observations which they brought to our notice.

There were altogether 306 Parsees in Lower Damaun, including males, females, and children. Of these, 276 were inoculated twice, and one once, all the particulars being given in our inoculation register. The names and particulars of the 29 who remained uninoculated were supplied to us on the spot. The attacks and casualties from plague which occurred in the two groups after the introduction of inoculation are given below. No deaths from any other cause occurred in the community from the beginning of the epidemic:—

Occurrences of plague amongst the 277 inoculated Parsees.

- (1) Jerbai, wife of Manekji Bacha, age 35, belonging to a well-to-do family; was five months pregnant; inoculated once on 17th April 1897, in the right arm. For about 24 hours before, she had fever and pain in the groin, but this was not known at the time of inoculation. Developed characteristic plague in the evening of the day of inoculation had an abortion on 20th morning, died same day.
- (2) Seven other Parsees inoculated were attacked, respectively, three days, one week, twelve days, a fortnight, one month, one month and five weeks after inoculation, but all these recovered.

Occurrences of plague amongst the 29 uninoculated Parsees.

- (1) Nanabhai Jivajee, male, age 60, belonging to a well-to-do family, where all the other members (14 in number), except himself, were inoculated. Attacked on 16th April 1897; bubo in left groin; died on 20th.
- (2) Merbai, daughter of Bairamjee, age 20 years, of a well-to-do family, where eight members were inoculated and four, including Merbai, were not inoculated; attacked about same time as Nanabhai Jivajee; bubo in right groin; died on 20th April.
- (3) Ratanbai Ratanjee, female, age 35, of a well-to-do family; attacked and died in the first days of May 1897, having had fever and a bubo.
- (4) An old woman, Avabai, widow of Rustomjee, age about 75 years, of a well-to-do family, where fourteen others were inoculated, Avabai and Gulbai, her daughter-in-law, being the only uninoculated. Avabai got attacked on 11th May, developed bubo two days later, died on the 13th.

Thus in the 29 uninoculated Parsees there were 4 deaths from plague, or a mortality of 13·8 per cent., while in the 277 inoculated there were 8 attacks with only 1 death, the one who died being a woman, attacked *before* inoculation, and the mortality thus produced in the inoculated being 0·36 per cent., or 38·3 times lower than in the uninoculated.

Another significant instance, in a limited number of people, was furnished by the servants belonging to Shet Sorabjee's house and to his garden. There are 50 servants in the house where he lives and about 150 in his garden, half a mile distant from the house. Round the garden the epidemic was raging violently. Of the whole number of servants one, a deformed individual, remained uninoculated, all the others were inoculated twice. Plague appeared among the servants on the 16th May when the only person uninoculated was attacked and succumbed on the 19th; the total number of inoculated lost also one, a child of 4 years.

The other instances given were in isolated families and referred to smaller numbers of people.

The German Commissioners completed this part of the inquiry by collecting information as to the soil of Upper and Lower Damaun, the hydrographic and climatic conditions obtaining in both, their comparative hygienic circumstances, etc. The facts supplied on these points were of an approximate character. The Committee returned to Bombay on the morning of the 22nd May.

Surgeon-Major Lyons went to Lower Damaun on the 26th May 1897, the object of his visit being to find out accurately, by a minute inquiry in each house, the number of deaths which occurred amongst those inoculated. For this purpose he divided the town into 4 sections, and during 4 days, between the 26th and 30th May 1897, visited all the houses, section by section. And as a number of dwellings had been vacated and the inhabitants encamped in the fields outside the town, Dr. Lyons visited them in their encampments and collected information from all of them. The frontier around the town being closed and guarded by a British and a Portuguese cordon, the conditions for collecting the necessary information were particularly complete.

In this manner Dr. Lyons collected the history of 33 deaths and 54 attacks with recovery which had occurred in the inoculated up to the 19th May (the time of the Scientific Committee's visit), and of 3 deaths* and 1 attack with recovery which occurred between that date and the 31st of May inclusive.

In the appendix are reproduced 88 "Investigation sheets"† filled up by Dr. Lyons during the house-to-house visitation, as well as one sent afterwards by His Excellency the Governor. Each of the investigation sheets contains particulars of a house where inoculated

* In this number of 3 deaths is included one* additional, in the person of Ghopal Bicara, 9 years, communicated by Dr. Fernandes through H. E. the Governor of Damaun.

† Not printed,

people lived, and where cases of plague had occurred, either among the inoculated or the uninoculated members of the family. These sheets, therefore, do not make mention of the inoculated households where no cases of plague occurred, nor of any of the attacked houses where there were no inoculated persons.

Comparative Analysis of the Mortality from Plague in Lower Damaun, in the inoculated and uninoculated, between the 26th March and the end of May 1897.

The inoculations in Damaun were done in four series :

First Series.—Between the 23rd and 26th March 1897, 846 persons were inoculated by Dr. R. M. Kalapesi, who was sent from the Laboratory, and between the 4th and 7th April, 171 persons by the Portuguese Physician in charge of the Plague Hospital in Damaun, Dr. Virgilio Poiarés, who was supplied with material also from the Bombay Laboratory. The lymph used by Drs. Kalapesi and Poiarés on that occasion, as will be described later on, was prepared from a strong virus, and produced a high febrile reaction when injected in the prescribed small standard doses. The operations of these two gentlemen differed in that Dr. Poiarés gave doses much weaker than those given by Dr. Kalapesi, as is shown by the detailed records of their operations. It will be observed from the results given below that, though Dr. Poiarés' patients appear to have given a considerable reduction of mortality when compared with the rest of the population, the results from his small doses were lower than those obtained from the same material given in larger doses.

Second Series.—A few weeks after the first series, the demand for further inoculations coming from Damaun became exceedingly persistent, as was the case, after an interval, in the six other places where inoculations were performed,—in Bombay, Mora, Damaun, Poona, Balsar and Tarapore; and though the Laboratory had run short of strong material, Dr. Kalapesi was deputed again, with a much weaker lymph than that used on the first occasion, as will be detailed later on. Between the 17th and 27th April, *i.e.*, about a month after his first visit, he performed 529 fresh inoculations, and between the 24th April and 2nd May 1897, 99 more were done by Dr. Poiarés with a similar material obtained for him from the Bombay Laboratory by the Bombay Portuguese Consulate. The lymph used on this occasion, even when injected in doses 2 to 3 times larger than the standard ones, failed to produce marked rise of temperature, though it caused considerable local reaction. As will be seen below, both Dr. Kalapesi's and Dr. Poiarés' operations, on this occasion, gave a smaller lowering of mortality than those previously performed, though they had both been working with increased doses.

Third Series.—Between the 21st and 23rd of May Dr. Kalapesi inoculated 362 persons with a similarly weak lymph, while Dr. Da-Cunha, another Portuguese Physician, who had been working in Damaun with Dr. Kalapesi, inoculated 190 persons with the same material.

Fourth Series.—Lastly, in August last, Dr. DaCunha inoculated over 100 persons with material supplied to him from the Bombay Laboratory.

Thus, altogether 2,297 persons were inoculated in Lower Damaun.

The visit of the Scientific Committee coincided with the time of the third series of inoculation, and Dr. Lyons' investigation extended to twelve days later, when the worst part of the epidemic was over, and the daily mortality had come down to below a dozen a day. The present analysis refers, therefore, to the occurrence of attacks and deaths amongst the 2,197 inoculated on the first three occasions, and is divided into three periods of observation, the first corresponding to the interval between the first and second series of inoculations, the second to the interval between the second and third series, and the third to the interval between the third series and the end of the month of May 1897, when the investigation was concluded.

First Period (between the First and Second Series of Inoculations).

At the time when the first series of inoculations was completed, the 26th March 1897, the total number of inhabitants in the affected villages of Damaun, namely, 10,900, had been reduced by 670, who had died of plague before that time, and by about 2,000 who had left the place before the closing of the frontiers.

Of the 8,230 remaining, 846 were inoculated by Dr. Kalapesi and 171 by Dr. Poiares in their first series of inoculations, while 7,213 remained uninoculated.

From that time up to the time when the second series of inoculations was completed, *i.e.*, the 23rd of April, the following were the occurrences in the respective groups of people:—

(a) Amongst the 846 inoculated by Dr. Kalapesi, there were 17 cases with 3 deaths. (Total mortality, 0.4 per cent.; case mortality, *i.e.*, percentage of deaths to attacks, 17.6 per cent.)

(b) Amongst the 171 inoculated by Dr. Poiares, there were 6 cases with 3 deaths. (Total mortality, 1.8 per cent.; case mortality, 50 per cent.)

- (c) Amongst the 7,213 uninoculated, there were 719 deaths.*
(Total mortality, 9.9 per cent.)

It will be seen that, if the 1,017 inoculated had exhibited the same susceptibility for plague as the uninoculated, and had had the same mortality of 9.9 per cent., the number of deaths amongst them would have been 101 instead of 6, a difference of 94.1 per cent.

Second Period (between the Second Series of inoculation and the Third Series, or the time of the Scientific Committee's visit).

By the time when the second series of inoculations was completed, the number of those inoculated by Dr. Kalapesi had decreased by the 3 deaths mentioned above, and increased by 529 newly inoculated, giving a total of 1,372.

The number of inoculated by Dr. Poiares had decreased by 3 deaths, and increased by 99 newly inoculated, giving a total of 267.

The number of uninoculated had decreased by 716 deaths and by the 628 newly inoculated, leaving a total of 5,869 uninoculated.

From the time of the second series of inoculations up to the time of the Scientific Committee's visit, *viz.*, 19th of May last, the following were the occurrences in the three groups:—

- (a) Amongst the 1,372 inoculated by Dr. Kalapesi, there were 52 cases with 18 deaths. (Total mortality, 1.3 per cent. ; case mortality, 34.6 per cent.)
- (b) Amongst the 267 inoculated by Dr. Poiares, there were 12 cases with 9 deaths. (Total mortality, 3.3 per cent. ; case mortality, 75 per cent.)
- (c) Amongst the 5,869 uninoculated, there were 674 deaths. (Total mortality, 11.5 per cent.)

It will be observed that if during the second period of observation the 1,639 inoculated had had the same mortality as the 5,869 uninoculated, they should have lost 188 instead of 27, which represents a difference of 85.6 per cent.

Third Period (between the Third Series of inoculations and the his end of May, or the time when Surgeon-Major Lyons concluded investigation).

At the time of the Scientific Committee's visit to Damaun, the number of inoculated by Dr. Kalapesi had decreased by 18 deaths, and increased by 552 inoculated by him and Dr. DaCunha, giving a total of 1,906.

* As a matter of fact, much more than that, the figure 716 deaths, 9.9 per cent. implying that during the initial three weeks of the epidemic, before the introduction of inoculation and during the first period of four weeks after the inoculations, the worst period in the whole epidemic, the mortality was uniformly 26 deaths a day, which, of course, was not the case.

The number of inoculated by Dr. Poiares had decreased by 9 deaths, leaving a total of 258 inoculated.

The number of uninoculated had decreased by 674 deaths and by 552 who got themselves inoculated, leaving 4,643 uninoculated.

During the 12 days which elapsed till Dr. Lyons completed his investigation, these groups produced—

(a) The 1,906 inoculated by Dr. Kalapesi, 1 case with 1 death. (Mortality 0·05 per cent.)

(b) The 258 inoculated by Dr. Poiares, 3 cases with 2 deaths. (Mortality 0·8 per cent.)

(c) The 4,643 uninoculated—93 deaths. (Mortality 2 per cent.)

Calculating upon the death-rate amongst the uninoculated, the 2,164 inoculated should have had 43 deaths instead of the 3, which is a difference of 93 per cent.

During the three periods of observation put together, between the 26th March and the end of May, 6,033 uninoculated had 1,482 deaths (24·6 per cent.), while 2,197 inoculated had 36 deaths (1·6 per cent.). Calculating upon the death-rate among the uninoculated we have seen that the inoculated should have had altogether 332 deaths instead of 36. This represents a difference in mortality of 89·2 per cent.

Considering the large proportion in which the number of inoculated stands to the rest of the population (2,197 to 6,033), it is evidently impossible that the inoculated represented the upper, or any other particular, class of the population possessing a degree of personal or local immunity much different from that of the rest of the population and to which their reduced death-rate could be ascribed.

This view is confirmed by the following comparison of the mortality which occurred in the inoculated and uninoculated persons belonging to the same families, who lived therefore under absolutely identical conditions of life.

In a large number of households the whole of the members of the family were inoculated, leaving none for comparison as regards susceptibility to the disease. This circumstance rendered it necessary to compare the whole inoculated population with the whole of the uninoculated population, as has been done above. However, in 62 of the inoculated families in which cases occurred, there were 124 persons who remained uninoculated, while the number of inoculated in these families was 250. A comparison between this fraction of the inoculated population with their uninoculated relatives shows the following result:

124 uninoculated had 54 cases (43·5 per cent.) with 37 deaths (29·8 per cent., case mortality 68·5 per cent.).

250 inoculated had 50 cases (20 per cent.), with 20 deaths (8 per cent., case mortality 40 per cent.).

The inoculated households lived, therefore, under no specially immune conditions, as the mortality among their uninoculated members, 29.8 per cent., was 5.2 per cent., higher than the mortality in the general uninoculated population. This must invariably be the case, as only people from badly-affected or particularly-threatened localities present themselves for inoculation. It will be noticed also that this small number of 124 uninoculated had a mortality higher by 1 death than the total mortality sustained by the 2,197 inoculated inhabitants of Damaun; and that a comparison between the inoculated and uninoculated members of these families shows that if the 250 inoculated had exhibited the same susceptibility as their 124 uninoculated relatives, they should have had 75 deaths instead of 20, a difference of 73.3 per cent.*

A similar conclusion is arrived at on comparing the mortality in the Parsee community quoted above, and which shows that the inoculated members gave a reduction of 97.4 per cent. of deaths when compared with the uninoculated of the same community.

It has been mentioned that the lymph used in Damaun in the first series of inoculations was of an active stock, prepared from a highly virulent microbe, and produced a brisk febrile reaction when used in relatively small doses. Owing to the great pressure of work during the epidemic, no method for keeping up the strength of the plague bacilli has been worked out, and the microbe from which the plague lymph was manufactured was allowed to gradually sink in virulence till it became almost harmless when inoculated into rodents. It was lymph thus weakened that was used in the subsequent inoculations.

A comparison between the first and second series of inoculations† done with the strong and with the weak vaccines, respectively, shows

*As far as the small numbers from which the figure 73.3 per cent. is obtained permit of drawing conclusions, the comparison between this figure and 89.2 per cent. by which the mortality in the *total* inoculated population differed from the mortality in the *total* uninoculated, would seem to indicate that the presence of uninoculated members in a family reduces the safety of the inoculated, and that, like in small-pox vaccination, the duty of the individual is to be inoculated for the safety of his neighbours in the community.

† The third series, done shortly before the conclusion of the observations, is left out of this comparison, only one death having occurred amongst those inoculated on the third occasion (see attached Rolls).

a difference in result in direct correspondence with the difference in the material used, as will be seen from the following table :—

1,017 inoculated on the first occasion had 49 cases (4·8 per cent.) with 15 deaths (1·5 per cent., case mortality 30·6 per cent.).

628 inoculated on the second occasion had 41 cases (6·5 per cent.) with 20 deaths (3·2 per cent., case mortality 48·8 per cent.).

The total mortality and the percentage of deaths to cases amongst the inoculated on the second occasion, though they were exposed to the risk of infection during the milder period of the epidemic, was, respectively, 2·2 and 1·6 times higher than amongst those inoculated on the first occasion.

Also as mentioned already, Dr. Poiares in his operations used doses considerably lower than those given by Dr. Kalapesi. The difference in the results of these two groups of operations corresponded again to the difference in the method employed, as is seen below :—

Amongst the 1,924 inoculated by Dr. Kalapesi, there were 70 cases (3·6 per cent.) with 22 deaths (1·1 per cent., case mortality 31·4 per cent.).

Amongst the 270 inoculated by Dr. Poiares, there were 21 cases (7·8 per cent.) with 14 deaths (5·2 per cent., case mortality 66·7 per cent.).

Thus amongst the inoculated with reduced doses, small though their death-rate (5·2 per cent.) was when compared with the death-rate in the uninoculated population (24·6 per cent.), the total mortality was 4·5 times and the case mortality 2·1 times higher than that amongst the inoculated with larger doses.

This variation of the results, answering faithfully to the variation in the strength of the lymph and in the doses given, shows the direct connection of cause and effect in the two series of facts, and makes it probable that it will be in our power to improve upon the results obtained in Damaun.

It also indicates, when the actual figures are examined, that the plague prophylactic has a greater influence upon the number of deaths than upon the number of attacks. This result repeated itself in all the observations collected up to the present on the plague inoculation, and seems to stand in a comprehensible connection with the plan followed in working it out. If this surmise is correct, it will be in our will to effect a further reduction in the number of attacks by correspondingly modifying the composition of the plague prophylactic.

The above satisfactory results were obtained in one of the most virulent outbreaks that have been observed in India in the present epidemic, and during the 9 weeks which corresponded to the highest stage of that outbreak.

The question as to the final duration of the effect of the plague inoculation remains unsolved, but loses its urgent interest in view of the above results.

No. 17.

No. 2713, dated Calcutta, the 22nd December 1897.

From—J. P. HEWETT, Esq., C.I.E., Secretary to the Government of India, Home Department,

To—The Secretary to the Government of Bombay, General Department.

I am directed to forward, for the information of the Governor in Council, the accompanying copy of a letter, dated the 20th November 1897, from Mons. W. M. Haffkine, in which he suggests a system for preventive inoculation against plague on an extensive scale. M. Haffkine has been instructed to address the Government of Bombay on the subject of his proposals. The result of the inoculations performed at Damaun, described in the joint report prepared by M. Haffkine and Surgeon-Major Lyons, appears to the Government of India to be distinctly encouraging, and they have no doubt that the Government of Bombay will afford M. Haffkine all practicable assistance in making a further trial of his system in the localities in the Bombay Presidency, which are at present infected with plague.

No. 18.

No. 2714, dated Calcutta, the 22nd December 1897.

From—J. P. HEWETT, Esq., C.I.E., Secretary to the Government of India, Home Department,

To—Mons. W. M. HAFKINE, Hardwar.

I am directed to acknowledge the receipt of your letter, dated the 20th November 1897, forwarding a joint report prepared by Surgeon-Major Lyons and yourself on the epidemic of plague in Lower Damaun, and on the result of preventive inoculation performed there.

The Government of India have, I am to say, read your report with the greatest interest, and consider the results of the inoculation experiments in Damaun to be distinctly encouraging.

35 Description of Plague : its causes and characteristics. [App. I.

2. I am to request that you will address the Government of Bombay with regard to your suggestion that a system should be organized for carrying out preventive inoculation against plague on an extensive scale. That Government, to which a copy of your letter of 20th November has been sent, will no doubt afford you all practicable assistance in making a further trial of your system in the localities at present infected with plague.

APPENDIX II.

PREVIOUS HISTORY OF PLAGUE IN INDIA.

PAPER Nos.	CONTENTS.	PAGES
1—2.	The plague epidemic in Kathiawar—	
	1. Report by Dr. Gilder	59—64
	2. Report by Dr. Whyte	64—80
3.	Pali Plague.—Description of the fever prevailing at Bareilly in 1836-37, by Mr. H. Guthrie, Civil Surgeon	80—82
4—5.	Mahamari—	
	4. Dr. Hutcheson's note	82—100
	5. Dr. Stiven's report	100—106

APPENDIX II.

PREVIOUS HISTORY OF PLAGUE IN INDIA.

The Plague Epidemic in Kathiawar.

REPORT BY DR. GILDER.

No. 1.

Dated Ahmedabad, the 25th February 1820.

From—J. GILDER, Esq., Civil Surgeon, Ahmedabad,

To—GEORGE OGILVY, Esq., Secretary to the Medical Board, Bombay.

1. I beg to acknowledge the receipt of the Board's letter, dated the 14th instant, requesting information on the alarming and fatal disease raging in various places dependant on this Zilla and Collectorate; and, in reply, I have the honour of submitting for their consideration the result of my enquiries on this subject.

2. Previous, however, to entering into detail of the history and nature of the disease which has for such a length of time been raging to the westward, it may not be amiss to set out with a short description of the soil, climate, and inhabitants of that division of the peninsula of Guzerat, commonly known by the name of Jháláwar, the more immediate scene of its ravages.

3. Jháláwar, the most northern district of the peninsula, derives its appellation from the tribe of Jhalla Rajpoots, who, in former times, formed the chief portion of its inhabitants. It is bounded to the east and south by Goelwar, part of Káthiáwar proper, and the Run to the north and west by Káthiáwar proper, part of Hallar, that part of the Run termed Null-khanta, and the Company's district of Veerungaum comprised within the collectorate of Ahmedabad. The principal towns are Limree, Wudwar, Drangadra, Hulwud, and Dundooka; the three former have a Thakore of their own. Of these however the Thakoreship of Limree is far the most extensive and has suffered most from the destructive ravages of the disease. The face of the country presents in general a flat level surface denuded of vegetation, except in the more immediate neighbourhood of towns and villages. The soil for the greater part consists of a rich black loamy mould, here and there intersected with portions of salt marshy tracts branching off from the Run. In the vicinity of Drangadra and Wudwar it assumes a more gravelly appearance: the chief products are wheat, gram, and cotton. The principal river is the Khadur, a small stream which takes its rise in a hill called Mandwa in Káthiáwar, whence, flowing in an easterly direction by Palliad and Ranpour, it loses itself in the Run near Dhollera.

4. The climate differs but little from that of Guzerat in general. The constant exhalation however of noxious effluvia throughout the year from the extensive tracts of salt marsh, covered with profuse and rank vegetation within the limits of the tides which surround the head of the Gulf of Cambay, and project for many miles within land must doubtless exert a pernicious influence on the atmosphere in its vicinity, and may probably confer on it the property of retaining within certain limits the proximate causes of a disease, whether contagious or the reverse; when once introduced, this may possibly be thought too hypothetical an inference, but little doubt can exist that such exhalations tend materially to corrupt the air, thereby rendering those who inhale it more immediately predisposed to receive the fomites of a disease lurking in their neighbourhood.

5. The principal inhabitants of this part of the country are Grassias of the Rajpoot tribe of Jhalla, Brahmins of the Shravoe or Jain sect, Khoombies, Kolies, and a few Bhoras.

6. As it is at all times a matter of difficulty to obtain from native authority information whereon reliance can be placed, and as they invariably either exaggerate or distort the subject of their communications whenever such refer to circumstances beyond their limited comprehension, such as in the case of any prevailing disorders, etc. To the following remarks therefore on the origin, symptoms and progress of the disease now raging to the westward, the Board's indulgence is solicited, no case having lately fallen under my personal inspection.

7. In tracing the origin of the disease in question the natives agree in referring the period of its first introduction to the Hindoo year or Sumwut 1873 = A. D. 1817, three years subsequent to the dreadful famine which raged with such destructive fury over Guzerat and Káthiáwar. It first broke out at Dhollera, where they say it was introduced from Moorvee, a town in Káthiáwar proper; they are not quite agreed as to the precise mode of introducing; some alleging it to have been conveyed by merchants and petty traders from Kutch, others referring it to those people who used annually to come from Kutch in the cotton season (February to May) with their wheels for separating cotton from its seed. They, however, coincide in the material point of its having been imported from the westward.

8. It is worthy of remark that although the disease was in the town of Dhollera, three people only were attacked, all of whom died. From Dhollera it spread over the neighbouring villages of Burrad Rojka, Peeplee, etc., and reached Dundooka; it continued in this neighbourhood till the close of 1817 (diffusing its baneful influence amongst the villages situated on the Run), being the same disease to which the

Board allude in the concluding part of the 3rd paragraph of their letter, when it gradually decreased, but did not disappear altogether, for several insulated cases were constantly occurring in the numerous villages of the Dundooka and Limree districts; it continued lurking in this manner till the beginning of last year, when it broke out with renovated fury at the village of Buriad in the month of April; this place is situated 3 miles to the westward of Dhollera; it raged here till the setting in of the monsoon, and during the period of two months 40 families were literally annihilated. In the beginning of June it spread to Rajka village, 3 coss to the west of the former, and nearly depopulated it; during the rains it diffused itself over a large tract of country, carrying consternation and certain destruction wherever it went; it manifested equal virulence at several places (though remote from each other) much about the same time.

9. It was towards the end of June it first appeared at Limree. The fatal effects and dreadful ravages it made here were so awful that the poor, terrified inhabitants, after losing from 1,500 to 2,000 of their number, deserted the place entirely for a time, leaving a few to perform the last melancholy rites of burning or burial to such of their relatives and friends as were lingering under the disease, and who, they were aware, had but a short time to suffer from its known rapidity and certainty in terminating fatally, a person attacked seldom surviving the third day after its commencement.

10. Subsequent to the dispersion of the inhabitants of Limree, the disease abated in violence there, only to break out with increased vigour in several other towns, and villages both to the east and west of it, where it successively manifested itself, and some of which it entirely depopulated. It should be remembered that while this work of destruction was going on, the rains were pouring down in torrents, the whole surface of the country between each village, which is generally situated on a rising ground or artificial hillock, presented to the view but one sheet of water, and by thus impeding the communication betwixt different parts of the country, and confining the inhabitants within the precincts of their respective habitations compelling them as it were to inhale an atmosphere already overladen with morbid effluvia, additional strength was given to the disease, and its victims were, as it may readily be supposed, proportionately numerous.

11. The utmost eastern limit of its progress hitherto has been the village of Ballole in the Limree district on the western bank of the Run, and about 25 coss west of this city; it has not hitherto made its appearance to the eastward of this salt marshy Bett. The destructive course of this dreadful scourge seems to confine itself principally to such of the native population as subsist entirely on vegetable diet,

Mr. Orton, in proceeding from Kaira to Bhore in October 1820, had information of the prevalence of this disease at Rhadanpoor Summer and other towns and villages about the latitude of 23-40° of them all.

at different periods while it was prevailing in Guzerat.

JOHN SCOTT,
S. M. B.
10-10-1836.

namely, Brahmins, Soonars, Durzees, and Khoomthees; those using animal food with few exceptions generally escaping. What is singular and may tend to corroborate an idea of its being under certain circumstances contagious is the fact that when it once obtains a footing in a particular tribe or profession, such as Banias, Soonars, tailors, etc., it seldom abates without having gone through every individual of such tribe resident at the same place, and in general making victims of them all.

Symptoms and effects.

12. From the native definitions of the symptoms of this disease, one might be led to infer the existence of two distinct diseases; this supposition might at first seem corroborated by their having separate names for each. The one they term *Ghaut no rogue* or the knotty disease; the other they distinguish by the appellations of *Kogla no rogue* and *Tao no rogue*, signifying the expectorating disease and the fever disease; these, though equally severe in their characteristic symptoms and similarly fatal in their effects, may only be aggravated varieties of the same disorder, acted upon by a vitiated atmosphere and other local causes which could only be successfully developed by personal investigation. They describe the *Ghaut no rogue* to possess the following symptoms:—great and general uneasiness of the frame, pains in the head, lumbar region and joints on the day of the attack, hard, knotty and highly painful swellings of the inguinal or axillary glands (whence the name) appear in some instances; the parotids are affected in 4 or 5 hours, fever supervenes; these symptoms go on increasing in violence, attended with great thirst and delirium until the third day of the attack, when death closes the scene; and should the patient survive the third day, they begin to conceive hopes of his recovery; suppuration of the glandular swellings occurs on the fourth or fifth day, the other symptoms gradually diminish in force, the fever assumes a milder aspect, and the patient regains his strength in 12 or 15 days; such favorable terminations are however rare.

13. This form of the disease was introduced into the village of Ballole in the end of December last by a Banian of the place who had returned from Dewpoora whither he had been on business and where it was raging at the time; the night after his return he complained of great uneasiness, pains in his loins and joints attended with fever; these symptoms continued increasing throughout the night, and the next morning he perceived swellings of his inguinal glands which were exceedingly painful during the day; he became delirious and complained of intense thirst; no abatement occurred on the third day, on the evening of which he died; every person belonging to this man's family, both male and female, died within the space of 10 days of the same disease;

it spread to the other two Banian families in the village, committing similar ravages. After remaining about 15 days from its first introduction, during which period it destroyed about 30 of the inhabitants out of a population of nearly 200, it disappeared.

14. The following case occurred in May 1817 at Dhollera while I was there on business. It happened in a lad 14 years of age. I have stated the symptoms and treatment from the best of my recollection, and though it terminated fatally, I am inclined to think bleeding and the use of brisk cathartics in the early stage of the disease would go a great way in arresting the progress of this destructive malady.

15. The disease was ushered in with considerable pain in the head and loins, sickness at the stomach and vomiting of bilious matter, turgidness of the eye, full strong and hard pulse, skin dry and intensely hot. I immediately gave him a strong cathartic of jalap and calomel, and took away 12 ounces of blood; the symptoms subsided in two or three hours after the operation of the medicine, but returned with increased violence; the following morning when I repeated the medicine and bleeding this partially relieved him; an exacerbation of all the symptoms took place in the evening with an enlargement of the glands in both armpits which continued to increase throughout the night, but without assuming any circumscribed appearance as in common bubo; he died at sunrise the third morning from the attack; this boy was living in a small hut surrounded by his relations who of course performed all the requisite duties his situation required, but not one of them was affected by the disease. Of five of other cases the first symptom yielded to brisk cathartics. In the same compound where these cases occurred, there were upwards of 200 people, including children, all of whom came from the same district.

16. The other form of the disease, known to the natives by the names of *Kogla* and *Tao no rogue* and which at present prevails most, they describe as exhibiting the undermentioned symptoms. High fever attended with burning and excruciating pains about the scrobiculis cordis, skin intensely hot, and the patient feels as if his body within was on fire, hiccough with deep and oppressive breathing ensue, he also feels a pricking sensation all over his body as if it was perforated with pins, considerable pains in the chest and joints, and about the navel, delirium, great anxiety, and thirst follow; at length the patient hawks up clots of blood, the difficulty of breathing increases, and he generally dies the second day of the attack. In both cases native practitioners administer stimulants for the first and astringent for the ultimate stages of the disease; but being prejudicially averse to purgatives which experience teaches us are the principal and only effectual remedies prescribable in the fevers of India, their labours are unattended with success. •

17. I shall not presume upon the Board's patience further by attempting to investigate the laws by which this malady is controlled or account for the causes that produce it; I shall merely state that the name of the plague has in my humble opinion been erroneously given to it. From the limited experience I possess of its nature, I am inclined to think it an aggravated description of Typhus Fever, rendered more terrible in its effects from local causes, and a peculiar morbid state of the atmosphere which would probably yield to the usual antiphlogestic regime of European practice; but in the absence of more correct information, it would be useless enlarging upon these intricate points without the aid of practical experience and personal observation on the spot.

REPORT BY DR. WHYTE.

No. 1820.

No. 2.

From—THOMAS WHYTE, Esq., Assistant Surgeon,
To—The Secretary to the Medical Board, Bombay.

I have now the pleasure to acknowledge the receipt of your letter, dated the 19th February, directing me to institute some inquiry into the nature of a disease, said to be contagious, now raging in the neighbourhood of Káthiáwar and districts subordinate to the Collectorate of Ahmedabad. I was already moving, for this purpose, in the above direction at the time of my receiving your letter and shall first submit for your consideration a kind of journal of the principal facts, which I collected from the places where I visited, and afterwards with such remarks as a careful consideration of facts has produced.

The town of Morvee is a large place, surrounded with very high walls, situated pretty high on the bank of a fine river. Neither in it or its neighbourhood do there appear to exist any of those causes which are understood to produce the common Intermittent or Remittent fevers of this country, and the character of the place has in general been remarkable for health. The whole space within the walls is, however, crowded with houses; and although the population at present is very thin, they were probably filled with inhabitants before the place was visited by famine and sickness. The disease, which is the subject of this paper, distinguished all over this district by the general name of "Ghaut" (and which from the exact similarity between the symptoms of that now raging at Mooloe and Sila, and those described as the common appearances in 1817 is unquestionably the same disease) prevailed for five months in this town, three years ago. It began in the cold and lasted through the

hot months, without undergoing any change from the change of weather. It is in general stated to have carried off fifteen hundred people, which account, I should think, is exaggerated about two-thirds above the actual number. It must remain a subject of conjecture, however: for the different statements vary so much as to set all accuracy at defiance. The same doubt exists regarding the proportion between the deaths and recoveries, some declaring that one in ten recovered, others that not one in fifty did so, and a barber surgeon of the town informed me that two thousand recovered and two thousand five hundred died; he said he never meddled with the patients, till after the fifth day, when it is probable the principal part or whole of the danger was at an end. His practice consisted entirely of hot stimulating applications to the bubos; he gave no internal remedies. I saw and examined four of the recovered men, which number, although so small, seemed to be procured with difficulty, and may serve to show how few actually survived. In the houses of the three first no other person had been affected; in two there was no more than one bubo; the third had three, and of the whole only one suppurated. The fourth was a Mussulman who took care of cows and sold milk and ghce; his house, from his description, was very close and ill aired; out of nine composing his family, seven had been attacked by the same disease; he was first taken ill, two were seized two days after, and the rest successively at about an equal distance of time. Three died and four recovered. They all had first a severe fever which deprived them of their reason; on the second day in all who recovered the consequent debility was very great, and convalescence extremely slow. None of these four men entertained the smallest suspicion of contagion; one said he could not tell how he caught the disease, unless it was from his wife, to whom he had been married about six months before, and who then had a little itch up her thigh. He seemed to puzzle himself very much however in accounting for his illness, being not at all sure that his wife had been the cause of it; and the other three could assign no reason whatever. Indeed, no one in the towns considered the disease as contagious, and the Thakoor or chief brother seemed to have proved very satisfactorily in his own person that it was not so. He with a laudable kindness and anxiety for the welfare of his people had been in the habit of frequently visiting the sick, comforting them, enquiring into the nature of their complaints, handling and touching them, and all with complete impunity, from which, I think, we may safely infer that casual intercourse is unattended with much danger; it is probable, likewise, that the disease is not readily communicated by the touch, and possible that confinement to the same

apartment is in general necessary for its production. The only^o part of the town which did not suffer was the Thakoor's palace. It is a very large, well aired place, elevated above the other parts of the town in a slight degree, and contains about one hundred people, all of whom enjoy a perfect immunity. On the opposite side of the river, less than a quarter of a mile distant, on a very high and exposed situation, is a small village called Moorba, not one of whose inhabitants were attacked; although a daily and hourly communication was maintained during the whole period of the above five months. The people say that the river set bounds to the disease. On the same side of the river with Morvee the disease was communicated to a village two coss off, called Moolee; but the situation of this village is low, close and ill aired, being surrounded with jungle. It is more probably therefore that Moorba, and its exemption to its high and airy site, and that Moolee suffered from the opposite causes.

Wuccaneer is a large walled town, seated at the foot of a mountain of considerable height and on the bank of a very fine river, distant about eighteen miles from the Morvee. While this disease raged at the latter place, it likewise paid Wuccaneer a visit, and the people say that it came from Morvee. Here it lasted no longer than fifteen days, and was almost solely confined to one class of people, *viz.*, the Borahs, whose occupation is the manufacture of cotton cloths. I am told that the greater part of the cotton was imported from the surrounding country and part of it from Morvee. The number of deaths was estimated at 60 among the Borahs; and no more than four or five of all the other inhabitants suffered. These numbers too are probably correct; for the testimony of different people was nearly the same; and it is obvious that where the disease was so nearly confined to one set of people, it would be no difficult task to arrive at precision; every one who was attacked is said to have died. The Borahs became so much alarmed at a visitation so dreadfully severe and at the same time so partial, in which every one of them seemed to have been doomed to destruction, that they all left the town, and went to live upon the mountain in the neighbourhood, leaving only those that were sick in their houses, and one attendant upon each of them. The whole of these very soon died. Whenever they heard of a death, the friends of the deceased came down and performed the last offices as speedily as possible, returning again to their abode on the mountain; some of those who attended these funerals were taken ill, but not many could have suffered in this manner, for at the end of fifteen days, after their removal to the mountain, the disease had entirely disappeared from amongst them. When this was the case, they all came down and reoccupied their

houses, and they declare that after this no person was attacked with the disease. This is a curious and singular fact, affording a rare instance of a measure dictated by fear, and carried into effect without reason or reflection, being attended with complete success. In fact it corresponds very nearly with what has been recommended to be done, by one of our best writers, Dr. Adams, on such an occasion, and is a very good practical illustration of the measures which, with so much care, deliberation and strict induction from the facts before him he laid down, and thought likely to be successful. ●

In the town of Sura I was told that a travelling merchant had come thither and died, after six days' illness, from a fever accompanied with bubos. His wife had not been affected and left the village shortly after; after the lapse of a month, a woman of the caste who had taken care of cows was seized with the same disease and died in six days. She lived in a different part of the village to that where the merchant died. Eight or ten days after her death, a woman of the same caste and living in the same compound was likewise seized with this disease and died on the third day. Her death had occurred about twelve days before the time of my visiting the village, and up to this period no other person had been attacked. There were a great number of people living in the same compound, and both women had a number of children; the last who died had suckled an infant till the time of her death.

Then a Banyan's boy, who had come from Moolee, which is twenty miles distant, was here attacked with this disease and died, but did not communicate it to any other person. The people of the province say that this year the disease appeared first in Limree, afterwards in Wudoran, from which it came to Sila and Moolee. I visited the two last named places.

Moolee is a large and very populous town, the inhabitants being nearly all Rajpoots. It is surrounded with an old ruinous wall, full of breaches, which are all carefully stuffed with thorns, and every house has a wall of the same material, much higher than a man's head. No better means could possibly have been adopted completely to exclude ventilation, if this had been the sole object of the inhabitants, and it might fairly be made subject for dispute whether in shutting out their enemies, they have not shut in one far more powerful than the whole of them together. It is situated on the bank of a river, even now almost dried up, and the water of which is perfectly brackish. The disease had carried off in one month about 80 people and was still prevailing. I saw a great number who had bubos, without any fever, and was told that upwards of 120 had suffered in this way. These people walked about without either

alarm or inconvenience for none had died, and not many of the bubos suppurated. Not one with fever had survived. There was a description of cases here, distinguished by fever and hemorrhage, apparently, from the lungs, without bubos, which was reported to be as surely and even more speedily fatal than those with fever and bubos. It had been the most common form of the disease at first, and lately had but rarely appeared, but fortunately one case came under my observation. I say fortunately, for I had frequently heard it described both at Wuccaneer and Morvee, without being able to understand what was meant: every narrator so mixing his account of appearances and actual facts, with what he supposed to be their causes, and with the internal changes which he supposed to take place and immediately to produce death as involved all his descriptions in a cloud of utter confusion.

In this man the heat of the body was not much increased, nor the pulse greatly accelerated; his bowels were not disordered, nor did his tongue indicate much febrile irritation. He was able to walk about and converse, answering questions distinctly. No persons would have thought him in danger, but there existed in the patient's mind a degree of alarm and anxiety altogether disproportioned to the apparent symptoms. He had only been attacked that morning; all his consideration seemed absorbed with a pain in his chest. He answered to my questions whether he had not other pain, as in his head, his back or limbs, that these were slightly painful; but he immediately recurred to his chest, dwelling upon that with a look of the most painful distress, and if not questioned about other symptoms, it seems as if he would not have mentioned them. He had besides a very slight cough, so slight that it might easily have escaped unnoticed, and this was accompanied with a discharge of blood from the mouth. The following day he was delirious, had a burning skin, with a very quick pulse. I searched for, but found no bubos. He died in the course of the succeeding night, *i.e.*, in less than forty-eight hours from the first attack. The characteristic symptoms of this variety are slight cough, pain of the chest, and hemorrhage from the mouth, attended with fever, but no bubos.

I saw four other cases of the disease, all of which were marked by a low typhus fever, bubos in the groin or armpit (and in one case in the seat of the parotid and submaxillary glands of one side). In all there was the greatest debility; and in one a universal tremor of all the muscles of the body, giving a very singular appearance. All complained of great thirst, the tongue was covered with a white fur in the centre, through which and at the edges were seen the papillæ of a shining fiery-red appearance. In none were either petichæ or

carbuncles to be seen ; and I may observe that I have neither seen nor heard described either of these symptoms, nor any other cuticular affections except bubos. Petichiae might easily escape common observation ; carbuncles could not possibly do so. In general there is no more than one bubo, although in one of the above cases, where only one was visible, I distinctly felt hard knotty swellings in both armpits and in the opposite groin.

All the above cases, as well as those of two females of rank, which were not shewn to me, terminated fatally during first and second day of my visit, and no other cases occurred during my stay.

They had not the slightest opinion in the place of the disease being contagious ; indeed they were determinately of opinion that it was not so ; one man, the Thakoor's brother, confidently assured me that contagion was not the cause of the disease ; affirming boldly that no man could be a better judge of the question, for that none had had greater experience ; he having lost in his own family eight women and one boy. No, no, said he, "Oorta juda." Contagion is quite a different thing. Another woman died, in this man's house, while I was here, making a total of ten in his house. Nothing can shew more clearly the evil arising from bigotted prepossession than the case of this man's family. It is difficult to conceive what he would have considered as satisfactory proof of the reality of contagion. To the unprejudiced observer, the probability will appear very strong that these women caught the disease one from the other, and that the boy got it likewise from them, or which is the same thing, that the atmosphere of the apartment where they lived, being rendered infectious by the effluvia of the disease, proved afterwards the source of disease and death to those who are living continually under its influence. These were women of rank, and the seclusion to which they have been doomed by the force of opinion and custom is well known. It operated so far as to prevent my seeing the two women mentioned above as having died, one of which belonged to this family. They sometimes said that this was no disease, but an order from the Almighty to remove whomsoever it attacked. They therefore probably thought all resistance wicked or vain, and it is to be feared that this belief in fatalism will prove an insurmountable bar to the execution of those measures which alone promise to be effectual in checking the progress of this scourge. I tried and exhausted all the means of argument and persuasion at this place without the smallest benefit. Nothing, I am afraid, but the strong arm of power will avail, and of direct authority in these towns we possess none. Sila is a large walled town in the neighbourhood of an extensive tank which supplies excellent water. The disease had prevailed here about two months

and a half. At first it had been very severe and general, but lately it had become more partial in its attacks. The same class of people, *vis.*, the Borahs, that had suffered so much at Wuccaneer, were likewise the first attacked here, and had suffered, in a proportion, greatly beyond that of the other classes; one hundred and twenty were said to have died, of which sixty were Borahs. In some particular houses the loss had been very great, some losing five, and others eight or nine of their inhabitants; at one time they thought the disease contagious, for that people returning from funerals had been suddenly attacked and carried off, but lately it had lost, in their opinion, that character. One of those houses said to have suffered particularly was an oilman's; five people died in it. It was told in Moollee that one man of the same profession had died. The total number of people of this description living in Sila is said to be fifty, in Moollee thirty. I was here shewn the cases of four people in advanced stages of the disease; they were the only survivors, and only one appeared to be in any danger, or rather in any doubt, for in her case even the danger appeared to be nearly over.

She was in the ninth day of the disease, had a bubo in the upper part of each thigh, both very painful to the touch, which came on the second or third day of a fever which had deprived her, for a time, of her senses; even at this time her mental powers so weak that she found it difficult to command attention to any subject, and her memory seemed frequently to fail her; she was exceedingly weak in body as well as mind; her eyes had a glassy appearance, and one was partially suffused with blood; a very severe purging had just terminated after some days' duration; she had likewise suffered much from copious and universal sweats: but both these symptoms, from the period of their appearance, seem to have been the prelude to improvement. She is ignorant as to the cause of her disease; it was not in her immediate neighbourhood at the time, and has not apparently been communicated to any other person. She lies in a veranda, the front part of which is closed up with a wall of kirby stalks, and several calves, as well as men, women, and children, are companions in this apartment. Second case, a poor woman, in a very low and wretched hovel, with only one small aperture for entrance. She had suffered severely from fever, but is now free from it, has no recollection of anything that befell her for several days: has one bubo a little below the groin. She had attended a woman who died of the same disease; has not communicated the disease to any other person, but appears to live almost entirely alone.

Third case, a boy with a large irregular bubo of a livid gangrenous appearance, occupying the whole cluster of glands at the upper

part of the thigh, and discharging a thin ichor; does not know how he caught the disease, had been insensible for some time, but says the bubo and fever came on together. He lies in an open veranda fronting the street. Both this and the former patient are very weak. Judging from the hardness and quantity of dirt accumulated on this boy's skin, he cannot have washed his body for years.

Fourth case, a Dair woman, with a large bubo in one armpit, the top of which is covered with a white slough. The bubo has a gangrenous appearance; but she says she has not had any fever. No other person has had this disease in the Dairwar, which is a large and populous place, close to but outside the walls of the town. There were not many of these wretched outcasts in the towns named above, and they had not, I believe, a separate place assigned them, as in the present instance; but lived within the walls.

A Banyan's wife had just died in the town on the ninth day of her illness; she had a bubo on one side of the neck, the inflammation and swelling from which had extended over to the other side appearing to occupy the whole throat. Her brother had died a little before her in the same house on the third day. There were no fresh cases at present in the town, and they thought it was leaving them. On its first visitation, that form noticed above as distinguished by fever, slight cough, pain of the chest and hemorrhage had been the most common; it had disappeared for some time. This variety seems to have appeared first at every place which has yet been visited. I may remark that the famous plague of Athens is said to have been ushered in by an Epidemic Catarrh, or Pleurisy, which yielded to no remedy and which gradually gave way to a fever accompanied by the true pestilential tokens. In the town of Sila only seven or eight are said to have had "tunda ghaut," or bubos without fever.

Before proceeding farther, it seems necessary to take notice of some peculiarities of the people in this province, which in my opinion exert a powerful influence over the progress, at least, of this disease. They are the only people, whom I have seen in India, who might properly be termed filthy. Ablution, which from being sanctioned and enjoined by divine authority, in every other place, is practised with all the diligence and scrupulosity of their other religious ceremonies in Káthiáwar, from what cause I know not, is almost wholly neglected. The evil consequences of this neglect are much increased by the enormous quantity of clothes which it is the fashion for all ranks to wear; and in most ranks these clothes are but seldom changed; in some of the inferior it seems almost as if they were allowed to rot upon the persons of their owners, without once being washed or ever removed from their first being put on, till they can no longer serve

the purpose of covering their nakedness ; another common practice in most parts of India, friction of the body with oil, which might in some measure have counteracted the evil consequences of the other neglect, is unfortunately here also in equal disuse. This very grateful and salutary practice which by encouraging and at the same time modifying the process of perspiration has so powerful an effect in regulating the temperature of the body, as well as in preserving the balance of the circulation, and by preventing cuticular absorption must prevent the admission of contagion into the system, in that direction, has upon very good authority and extensive experience been supposed a complete preventive, as well as a powerful agent in the cure of plague. If this disease is plague, some of the facts, above related, are sadly at variance with this opinion. I hope, however, I may not be accused of giving way, too far, to prepossession on the present subject, if I declare that my opinion of the efficacy of this practice, has not been much shaken by them. The facts were not witnessed by, but reported to me, and I had dwelt so much upon the necessity of ablution and oily friction in my conversation with the inhabitants, that I shall not be much surprised if, when I enquired regarding the oil manufactures, they had invented these circumstances to excuse to themselves and me, their own apathy and neglect of the precaution, which I had pointed out. If this disease is communicated by the touch, there can be no more powerful antidote than oily friction ; where infection is received with the breath, it will be efficacious only in so far as it invigorates the general system, thereby enabling it to resist its influence.

In addition to the above causes, which are permanent, it is likewise certain that, for some time past, the great body of the people have laboured under all the depressing disadvantages of precarious existence. It is not for me to investigate the political causes that may have been agents in reducing the country to its present state. It is probable that they were in a great measure unavoidable and impossible to be foreseen or even prevented, at least effectually. The country has in a short space of time undergone a most complete revolution ; the tide of public authority has on a sudden diverted into a totally new and totally different channel. The hundreds of little lords that once enjoyed perfect and independant authority in their own little districts, have, by this revolution, been deprived of everything but the name of independence. It is not therefore to be wondered at if those districts should for a time feel the want of the fostering influence which once protected them and to which they were attached by every tie. The severe famine, which visited this province, gave an influence to the above causes which otherwise they

would never have acquired ; the one thus aiding the other, they both gained an increase of force ; indeed pestilence and famine have so constantly gone together, and are so linked even in our speech that a sentence seems incomplete where one is pronounced without the other. The consequence of all has been general distress, general despondence, and general inactivity ; every town swarms with idlers, than which no more fertile source of disease exists. It may be truly said to set up ; its effects are so powerful that they may be traced even in individual instances ; but where indolence and inactivity affect a whole community, the consequences force themselves upon our notice. In Kathiawar industry is unknown in many places (in many it is beginning to revive) and seems particularly so in the districts where this disease has raged. Cultivation is almost neglected, and the inhabitants depend, principally, upon the milk and ghee furnished by their cattle for the means of subsistence. Partly from the cause and partly from the strictness of their religious tenets, which rigidly forbid the death of any animal, every family has accumulated a large stock of cattle, and these amounting to hundreds or thousands, according to the size of a town, are invariably driven within the walls at sunset and are penned for the night in the same house which contains the rest of the family. Thus no limits are set to the number of cattle accumulated in every family, excepting by death in consequence of disease or old age. Still all animals are doomed to die, and notwithstanding the humanity of religious tenets, this is a forfeit which must be paid in one way or other. In proportion, therefore, as we diminish the number of deaths by artificial or violent methods, we should naturally expect an increase to the number by natural causes, or, in other words, that disease and sickness would be multiplied. Accordingly we find this to be the case. The cattle of Kathiawar afford the clearest proof of it. Few seem altogether free from disease, and many are seen, in the most wretched condition, crippled with swelled legs, and diseased skins, crawling about.

Such a degree of obscurity hangs over the origin of most fevers as can seldom be removed by years of the best directed enquiry. After so many years of observation and experience, during the whole of which the eyes of an enlightened public have been diligently directed to the subject, it is still a matter of doubtful discussion what are the causes which produce the annual fever of North America. The same remark is applicable to the yellow fever of the West Indies, some still attributing it to contagion, others entirely to local causes. We are completely in the dark likewise as to the origin of almost all the specific contagions ; of one, we cannot be in doubt ; I mean the Cow-pox ; and many are of opinion, from their great similarity in many

points, that small-pox originally took its rise from the same source. It may perhaps facilitate our enquiry into the cause of the present disease if, before we proceed further, we can distinctly point out what at least are not agents in its production. We may then at once, and altogether, exclude from our consideration all putrifying animal and vegetable substances, all effluvia from jungles and marshes. Every one of the towns which have suffered from the disease in question that I have visited are in a remarkable degree exempted from everything that could produce these. Their situation was either on the rocky bank of a running stream or on a dry sandy soil. Leaving all these causes therefore out of sight, we may now observe that another of fever, at once the most common and the most destructive, has been clearly and indisputably ascertained, I mean the cause of infections of typhus fever. We now know that wherever a number of human beings are crowded and confined within a narrow space, where the atmosphere which they breathe cannot frequently be renewed; but on the contrary the effluvia from their bodies remain undiluted, and are allowed to accumulate; we know that when these effluvia have attained a sufficient degree of concentration, the atmosphere which is loaded with them will excite in the bodies of those who live within its influence a fever of the most malignant nature. This fever from the places which have in general been most favourable for its production has been called "gaol" or "hospital" or "ship" fever. Now I apprehend that it will be difficult to find a situation more likely to give rise to such a fever than many of the above walled and crowded towns will furnish. If, however, we include in our consideration the manner in which man and cattle are crowded in the same narrow unventilated spaces, that many of these cattle are labouring under diseases, regarding the nature of which we are ignorant (an epidemic or contagious disease has since the famine run through the whole of them) and that every predisposition is furnished in general by the listlessness and despondence impending over all the people, it will not appear improbable that disease should arise under such peculiar circumstances. Indeed it is what I think we might naturally look for and expect. From an atmosphere thus deteriorated, partly by the accumulation of human and partly by that of diseased brutal effluvia, we would expect a disease "sui generis," or at least resembling infectious fever, modified by the peculiarity of its causes, in fact specifically different. If, then, the causes which produce this disease are local and existing in the places where it has made its appearance, I think it probable that they may have taken their rise in the above unnatural association and seclusion of man and cattle, in close situations, within walled towns. I offer this however only as conjecture; and you will receive

it accordingly either as probably possible or absurd, according to the degree of credence which you think it deserves.

I am more inclined to believe that the disease was imported into this country, with which belief that of the people in general coincides, and there appear to me to be a great many facts which powerfully support it, and which could not satisfactorily be accounted for in any other way. It is not known to have attacked any two places simultaneously, however much alike in those local causes which might have given rise to it; but after appearing in one town, went after a little time to the town nearest; as from Limree to Wudwan, Sila, and Moollie this year; or from Morvee to Wuccaneer in 1817, affecting slightly the intermediate villages. The class of people first and principally affected both at Sila and Wuccaneer affords an additional presumption that in these instances the disease was imported, for it is every way probable that the cotton forms for conveying the contagion and sudden disappearance of the disease from Wuccaneer, upon the separation of the healthy from the sick part of the people, cannot be satisfactorily accounted for by any other supposition than that of imported contagion. If local causes had produced the disease, why was their operation not evident again after the return of the Borahs to their houses, for in so short a space no improvement in their condition could have taken place unless that of a diminution from their numbers be considered as one under such circumstances. Again that fact of the disease disappearing and again re-appearing after the lapse of years cannot be accounted for by local causes. It is probable that during the period of the disease being absent, these remained much the same; but, on the other hand, if we believe in imported contagion the difficulty is at once removed. If we consider the nature of fomites, we shall at once understand how it might be dormant at any length of time, and then, probably, by some accident, be at once brought into action, for it is well known that fomites, so far from losing their power by time will, if confined, acquire a great increase to it. Dr. Parr says that the last time the plague appeared in the town where he was writing, Exeter, it arose from a traveller remarking to his companion that formerly he had been confined by the plague in the room where they were sitting. "In that corner," said he, "the dressings kept, it is now plastered, but probably they are there still." With a poker he broke down the plastering, found the dressing and the disease was soon extensively disseminated. We may the rather wonder that the disease is so seldom produced or so seldom conveyed from one country into another; this indeed is a mystery which it is impossible to solve. Quarantine alone (considering the careless manner in which goods

are ventilated) is insufficient to account for the long exemption which England has enjoyed. In Bombay, where none is practised, although a constant intercourse is maintained between that part and the Red Sea, how shall we account for the disease never having been imported. A Dr. Lind (in the Medical Physical Journal) says that it has frequently been introduced into Surat from the ports in the Red Sea, but has never spread "owing to the inhabitants living in a constant stream of air." Upon what authority this assertion was made he does not inform us. Quarantine, I am informed, was enforced by the town of Dundooka this year; notwithstanding which the disease made its appearance there; however, as it is probable that the authority was not sufficient to prevent the introduction of goods, however easily people from the infected towns might have been excluded, no inference can fairly be drawn from this single instance. In the meantime it is certain that the disease has been introduced into many villages and even towns of a considerable size (than is a large walled town and otherwise favourable for its progress) without having spread. Dr. Rugoel had frequent occasion to remark this circumstance and without untying seems to have cut the knot by the gratuitous supposition of a pestilential atmosphere after having mentioned a variety of instances where the disease was introduced and yet did not spread. He says it, fomite, without a pestilential atmosphere, is insufficient for the production of the disease, which atmosphere approaches by slow, silent and imperceptible degrees, no human barrier being able to oppose its progress. We ought not, however, to deceive ourselves; there is in the above sentence no discovery of a new cause; the question is merely stated in different terms. We are not only ignorant as to the nature of this atmosphere, but even uncertain as to its existence; allow it once existence, and some circumstances attending the history of this disease, which before were involved in impenetrable mystery, may then be solved in an instant. We can account for the disease having hitherto being confined to one strip of country, distinguished by a particular name (Jallawan I believe), but by no other peculiarity favour the towns or districts in its immediate neighbourhood. We can then account for it coming close to the above limits, but never going beyond the prescribed boundary; the pestilential atmosphere has not yet gone beyond the said limit. In Europe the pestilential atmosphere has for a long time been confined to the countries of Russia and Spain; in Asia to Turkey and Egypt. Until, however, we are acquainted with the nature of this pestilential atmosphere, we shall remain where we were. Why is Turkey so subject to plague at the present day, although when its countries composed the Roman Empire, they were

almost always free from it. Sir John Pringle says the principal reasons of all this are the frequent ablutions enjoined by the Mahometan religion, while the neglect of these in Kathiawar has been thought a principal cause of the inhabitants suffering from a similar disease. Nothing can shew, more clearly, the danger attending all reasoning upon limited experience. All of the countries above named agree in one general circumstance; and that is that the inhabitants enjoy a less degree of that internal comfort, contentment, prosperity, peace of mind, which constitute the sum of human happiness (speaking generally) than those of the countries which are exempted from the ravages of this disease. England probably is indebted to her improved condition, in the general diet and manners of the people, for her long exemptions, and the other countries will be equally safe, when their internal situation shall be improved.

From all that has been said, I think it will be apparent that although this disease in a close ill-aired situation is highly contagious, in an open space it is quite the reverse. It has never remained long in any except the large and walled towns, where probably more or less infectious atmosphere always exists; while the town of Sila suffered so much, the Dairwan, which was outside the walls, was free. The Thakoor's house (the only one in the town well aired) at Morvee afforded safety to a hundred people, while the disease lasted for five months, in every other part of the town of Moorba; kept its inhabitants in safety for the same reason, and all the villages in the district may be said to have been safe, for the disease never spread generally among their inhabitants; and, lastly, when from fear, the sound part of the people even separated the diseased, the disease which, while the Borahs remained crowded in their dirty huts within the walls of Wuccaneer, threatened their entire destruction, was immediately and entirely removed, no doubt can exist that the disease was propagated by contagion in the house of the Thakoor's brother in Moolee, where, in one family, nine women and a boy died from it, or in the house of the Borahs in Morvee, where seven out of nine people living in a dirty confined house were successively attacked by it. I think it very probable, likewise, that the towns, which yet have been safe, are every day liable, by means of fomites, to have it introduced among their inhabitants, and that if unfavourable circumstances concur at its first introduction, it will spread in any of those towns whether they are placed within or without the limits of Jalliawar.

- The subject of prevention therefore is one of the utmost importance, and it is cheering to reflect that we have arrived at the knowledge of a plan by which, if its rules are rigidly attended to, we

have it in our power speedily to check the progress of this scourge, in any place where it may be introduced. These rules, to be completely effectual, however, require the aid of a vigilant police, guarded by sufficient authority; if introduced into this camp to day, I would not be under the smallest apprehensions of its spreading; unfortunately, however, the nature of the petty authorities in Kathiawar, combined with the apathy, indifference and uncleanly habits of the people, their mental despondence, belief in fatalism, and perhaps the neglect of oily frictions, present very great and perhaps insuperable difficulties to the proper execution of the necessary rules. Power is divided into so many minute portions that it dwindles into almost nothing; and that little, if the chieftain attempts to enforce it, subjects him to the risk of losing all his most industrious subjects. These, knowing very well their own importance, if displeased, immediately threaten to remove into the territories of some neighbouring lord, thus rendering their own a slave to their whims, caprices, and pettish humours. In consequence of this, the Chief, if ever so willing, would not possess sufficient authority of enforcing the necessary rules. These, I need hardly add, are such as would secure cleanliness, and a complete separation of every family where the disease had appeared from the remaining sound population; they ought to be compelled instantly to depart from the town and live in the open plain under a temporary encampment which (if the subject were thought of sufficient importance) might be erected at the public expense for the lower orders; it would be well if the clothes of the deceased were to be burned at the public expense likewise. Experience has proved that, if not crowded, in such a situation the disease would not spread, and there can be no doubt the beneficial consequences would even be a subject of joy and congratulation to every one who had a hand in promoting so benevolent a purpose.

It would perhaps have been better if I had, at an earlier period, said what I now intend to do, concerning the nature of this disease as I have, in many places, been compelled to anticipate, so far as to speak of it by a name, which I have no hesitation at once assigning to it, *vis.*, Pestis. Doubtless, in former times, all severe and fatal fevers were too indiscriminately classed under, and handed down to posterity with this denomination; on the other hand, it has been an error of physicians, more frequently, in later times, altogether to doubt the existence of this disease, until its ravages had fatally and too surely pronounced its nature. There is something so repulsive in the name of plague, one wishes naturally to beget a disbelief of its reality; let us be cautious how we feed a belief, which may be fraught with such dangerous consequences to hundreds of

our fellow-creatures, but equally free from prejudice either way ; let us dispassionately call in the aid of nosological definition to guide us through the difficulty. It is, I believe, allowed that although a great many more symptoms frequently attend it (and no disease has varied so much in various epidemics), yet that Cullen's definition includes all that are strictly pathognomonic : "*Typhus maxime contagiosa cum summa debilitate uncerto : morbi die eruptio bubonum vel anthracum* : " all these symptoms are present in the present disease in almost every case, and are mentioned always by the natives as distinguishing it. The very name which they have given to the disease " Ghaut " means literally a bubo. It is indeed true that petechiæ and carbuncles, if ever, are but seldom seen, symptoms commonly attendant on plague, but we may observe that petechiæ are not mentioned by Dr. Cullen, and that he mentions carbuncles in an ambiguous and guarded manner "*bubonum vel anthracum*," which by no means implies their constant and necessary presence.

It may be urged, likewise, that in one particular form, above described, no bubos are ever observed, but we learn from Dr. Russel the same thing was very common at Aleppo, and he seems to think that their non-appearance was owing to the rapid termination of these cases in death, which is extremely probable, for these eruptions do not come critically on a particular day, but "*uncerto morbi die*," and in the prognosis of this disease, the later they were in appearing, it has always been observed so much the greater has been the danger ; and, *vice versâ*, where they come out before the fever the danger is seldom great. The same thing has always been observed regarding the yellow colour of the skin in yellow fever ; when the patient dies very early in the disease, the yellow colour not appearing. Bubos are the grand distinguishing symptoms of the present disease, and if the patients were to live long enough, would doubtless invariably make their appearance. I apprehend, therefore, we shall be as little justified in refusing it a place under the head of plague as those authors have been, who have been so eager to class all malignant or putrid fevers under its name, merely because they were generally fatal, and bubos were sometimes though rarely and accidentally observed to make their appearance in them. " I feel it unnecessary to pursue this subject further than just to remark that all the other symptoms which have been enumerated as frequent in plague will be found in the different cases of this disease ; and if it were fair to infer anything from its fatality in this feature, it might justly claim pre-eminence of most those epidemics of which we have a history. I was told by the Thakoor's brother at Moolee that some of the women mentioned above were suddenly taken ill, in the midst of their usual avocations, that while conversing, in the middle of a sentence

they would fall down, blood come from their mouth (not in any great quantity) and death immediately follow. After allowing a sufficient portion of this account for exaggeration, enough will still remain to show how suddenly fatal, sometimes, its attacks have been. The symptoms in general were such as denoted rather nervous debility, as convulsive tremors of the muscles, inability to walk or stand after the first day, delirium or wandering of the mind, and a very weak pulse, than those which have been supposed to indicate a putrescent state of the fluids. The stomach and bowels were not remarkably deranged, there was no stoppage of the breath or excretion, no sordes upon the teeth, and the tongue was only coated with a white fur. Hemorrhage was the only symptom which could be supposed to arise from the latter cause. In women with child, abortion followed attacks of this disease, and a dead child was produced.

I shall avoid the subject of cure, having no facts that could at all illustrate it. At Moolee I gave a little medicine to two patients who died, as the others had done before them, notwithstanding which it evidently prejudiced the mind of the people against me (I believe they thought me invested with little less than divine power on my first arrival), and it operated so much in my disfavour at Sila, whither the news had travelled before me that when I first arrived they obstinately refused to let me see any of the sick.

Should I have any further opportunities of observing this disease, I shall communicate to you their result, but at present I am about to proceed in an opposite direction in company with Captain Barnewall on a tour to the westward and southward. I shall feel much obliged by the communication of any information on this subject, which you may have received in 1817 or since and have the honour to remain, etc.

Pali Plague.

DESCRIPTION OF THE FEVER PREVAILING AT BAREILLY **No. 3.**
IN 1836-37, BY MR. H. GUTHRIE, CIVIL SURGEON.

The fever here is much the same as that so well described by Mr. Spencer at Moradabad. On some occasions its first invasion is very insidious, and the unfortunate patient scarcely acknowledges that he is at all unwell; but, generally speaking, the first paroxysm is marked by a smart rigor, and this not subsequently repeated is soon followed by heat and thirst, continuing during the night, and gradually declining in the morning. There is seldom or never any sweating, and during the daily remission the thirst continues unabated. The tongue is very peculiar, being tremulous and awkwardly protruded,

presenting a red velvety border deeply indented by the teeth, the upper surface, with the exception of the red border, a quarter of an inch in breadth, is various, generally quite white: papillæ thickly and extremely raised, less frequently covered with a dark typhous crust, and in a few instances it is yellow or mottled by various shades of red slightly oozing blood, the teeth covered with sordes and the expression of face indicative of great distress. The patient seems unwilling to answer questions, or rather that he has not the power of arranging his thoughts. The brain or sensorium is affected variously, from slight frontal headache to deep coma: frightful dreams and delirium, with horrid moaning and tossing of the body from one position to another. Eyes generally dull, unexpressive and muddy, now and then streaked with red vessels, and too frequently of a deep yellow or saffron colour. In the course of a night I have frequently known the patient lose his sight by absorptive disorganization, the cornea merely protruding like the boiled eye of a fish; if any discharge, it is a slight serous one. Occasional severe pains in the throat and chest, with cough and expectoration; in the protracted stage, hiccough frequent and most distressing, with painful tension over the epigastric and hepatic regions. The spleen is seldom or never affected, abdomen tumid, hard, and sore on pressure: urine scanty, high-colored, and occasionally tinged with bile. Pains in the lower extremities severely complained of during the whole course of the disease, and even during convalescence in the upper it is chiefly felt in twitchings of the small tendons about the wrists, and quick involuntary movements among the fingers. There is throughout a ravenous desire for food, the indulgence in which is generally and immediately fatal; this bulimia continues up to the moment of dissolution. It is quite piteous the manner in which they implore food. Dr. Worrall took compassion on one poor wretch, but the congee, which is generally not hurtful, reached the stomach, he fell back and expired.

In most cases the fever is a remittent one, and the paroxysm daily steals on about dusk, continuing till morning. Many, however, die in the first paroxysm, completely overpowered, as if the powers both of body and mind were at once blighted. These paroxysms, excepting the first, are generally without rigors. If the fever protracts, it is accompanied with great prostration, active absorption of the soft parts, leaving merely skin to cover the bones: the skin does not break as in putrid fevers. The bowels are very easily moved and often spontaneously. At first the stools are very black, green, but from treatment soon become yellow and liquid. The state of the bowels is very delicate, and if the debility proceeds, a fatal diarrhoea sets in, which soon debars all hope of a recovery; the pulse at first is

140 or 150, or too quick to be counted, generally weak, soft and compressible. In only one case have I seen a glandular swelling, and that was on the top of the thigh. This disease differs from remittent fevers in general and common intermittents—in the saffron eye, state of the tongue, the ravenous desire for food, the latter being hurtful; as also bitters, hark, quinine, etc.—cold fit in the first paroxysm only, etc.

Into the dark cavern of nature, whence emerge these destructive and periodical epidemics, not even a scintilla of philosophical light has been thrown. This fever has, I understand, been dreadfully destructive in the neighbouring terrai, and one unfortunate village is said not to have one inhabitant left alive. As the medical officers supply their accounts, it may be found to extend to Marwar, if not to Guzrat.

As to its infectious character here within certain limits, I have no doubt, but it has laws of its own. When the town was devastated by it, the convicts had it not among them—but now it is *vice versa*. I have nothing to say in a brief hurried account like the present to the *questio vexata* of contagion; but this I do know and declare that those tending the sick and breathing their atmosphere night and day did take the disease, and severely. I will even be hardy enough to declare what I have seen before when hundreds were in hospital at Baitool and even at Allahabad with fever of an intermittent type that surgical patients and hospital attendants fell easily and frequently under the prevailing fever of whatever kind it was. Our epidemical knowledge is too confined to enable us satisfactorily to define the dark boundary betwixt general prevalence and 'particular contagion, either in certain districts of a country or among particular classes of human beings.

Mahamari.

DR. HUTCHESON'S NOTE.

No. 4.

1. The Plague, *Pestis septica*, Syrian, Levantine or Egyptian Plague, the Bubonic Plague of Western China, and Gola or *Phutthiya rog* and *Mahamari* of British Garhwal and Kumaun are doubtless one and the same disease, which has existed in all probability in the hill tracts of India and China from time immemorial.

2. The disease, so far as history records, was prevalent in Europe in the sixth century, B. C., and is said to have spread at this period over the greater part of the habitable globe; and since then it has been recorded in Syria, the Levant, Egypt, and elsewhere. Dale Ingram published a historical account of the disease as far back as

1755. Moscow was the scene of an outbreak in 1770, and in 1813 the disease prevailed at Malta and in 1834 at Cairo.

In India the disease has ever had a home, and prevails off and on till the present day in British Garhwal and Kumaun. In 1813 the plague was present in Central India and Rajputana, Kutch and Kattywar and was first noticed at Kumtakole, and spread throughout Wagar during January, February and March 1816, and by the end of that year had extended to Scinde where the mortality was great. The disease was still prevalent in Central India in 1819 and disappeared in 1821. Nothing more was heard of the disease in Central India till July 1836, when it broke out at Pali, a town of Marwar, whence it spread to Jodhpore. It prevailed at Deoghur, in Meywar, in March 1837, and thereafter extended to Jalia and Ramghat in the district of Ajmere. The disease all but disappeared towards the end of 1837, but in November of that year it again broke out in epidemic form at Pali, and continued till February the following year.

It is more than probable that the plague was introduced into Pali and Rajputana in 1837 from the Levant, as the "Chhipis," who printed the pieces of plain cloth brought from the coast from Bhow-nagar and Surat, were the first effected.

3. The Himalayan districts of the North-Western Provinces in which the disease occurs comprise—

- (1) Garhwal bounded on the north by Tibet, on the east by Kumaun, on the south by Bijnor and on the west by Tehri and Dehra Dun, and
- (2) Kumaun now divided into two revenue districts, Almora and Naini Tal, bounded on the north by Tibet, on the east by Nepal, on the west by Garhwal and on the south by the Tarai.

These contiguous districts lie between north latitude $28^{\circ} 14' 15''$ and $31^{\circ} 5' 30''$, and east longitude $76^{\circ} 6' 30''$ and $80^{\circ} 58' 15''$, and embrace an area of 11,038 square miles.

4. The population numbers close on 1,000,000 souls with an average of 72 to 76 persons to each square mile, living at elevations from 1,500 to over 11,000 feet above sea-level. For practical purposes the entire population may be classed as Hindu, as very few Musalmans, etc., are natives of the hills. The greater proportion of the population live at from 3,000 to 6,000 feet above sea-level, overlooked by the crowning peaks rising from 20,000 to over 25,000 feet of the great Himalayan range.

5. Outbreaks of the plague in these Himalayan hill tracts, the most mountainous in the world, are of two kinds—

- 1st, spontaneous outbreaks;
- 2nd, outbreaks caused by importation of the disease.

Spontaneous outbreaks are frequently associated with, and sometimes preceded by, a great mortality among rats, mice and other rodents, etc.

6. The plague or pestilence of the hill tracts is distinguished from all other fatal febrile malignant diseases by its extreme virulence, rapid course, fatality, and by the enlargement of the lymphatic (inguinal, axillary, cervical, etc.) glands,—the characteristic lesion of the disease when death does not ensue within the first three days from extreme virulence and direct shock of the great nerve centres. It has the shortest period of incubation probably of all known diseases, and it may prove fatal within 24 to 48 hours after exposure to infection, and there is clear evidence that the disease is communicable from the sick to the healthy.

7. The disease appears ever and anon in village or hamlet situated "on precipitous mountain side, in gorges reached only by means of a cradle swung on a rope above a boiling flood of snow water low down in a hill valley, in secluded spots reached by dubious pathways winding up a wooded glen starting from the river far below, or upland slope close to the sources of a river formed by a waterfall, in secluded places, wilder it would be hard to find in all the hills reached by a footpath winding over a high mountain and near where the Margari stream arises in cuplike valley surrounded by high mountains, on a spur hillock-shaped, on the slopes of opposing mountains, on hills of moderate height, in bends of a river hemmed in by the hills, on three sides on the brow of a hill which stands out from the mountain behind it, on the slope of a great mountain overlooking the valley in which the river runs, on green hillock backed by high mountains, and on a spur of rock jutting into a narrow valley," overlooked by the highest Himalayan peaks capped with the eternal snow. Here, where the atmosphere and climate are the finest and purest in the world, and at heights where the germs and microbes of disease are kept within a narrow sphere, exists a disease which in its infectious nature and fatality surpasses all others in virulence, and ever threatens to break bounds and spread and be disseminated far and wide as in past times throughout Christendom. Cholera spares some of the household, but the plague often reaps each one of the many members of the upland home. So dreaded is the disease, that family ties in its presence are suddenly broken, and the father and mother flee from their children and abandon each other, seeking the lone mountainside in despair for a time of all human association.

8. The earliest record of the disease in the hill tracts is embodied in a report, dated 25th April 1836, by Mr. Gowan, the Commissioner of Kumaun, in which it is stated that *mahewari*, which was thought

communicable by contact with articles in use in an infected tract, first appeared at Kedarnath in 1823. It originated, it was affirmed, in the person of the Rawal or the high priest of the celebrated temple there who, having in that year deviated from the rules prescribed in the Shastras for the performance of the religious ceremony called the "Home," was smitten with this new form of disease and died together with the Brahmins who assisted at the offering. From Kedarnath the disease spread to the villages in religious assignment to the temple, and afterwards appeared in other parganas of Garhwal. Others said that the disease came into existence for the first time at the Hardwar Fair.

9. In 1834-35 the appearance of the disease in the parganas of Nagpur and Badhan Garhwal was preceded by a great mortality among the rats in a village. The disease was characterised, it is stated, by fever terminating fatally in two, three or four days, and associated with an eruption of bubos or swellings.

10. During 1837 the disease was alarmingly prevalent in the pargana of Badhan along the higher parts of the Pindar river, and in 1846-47 it found its way to the sources of the Ramganga and almost entirely swept away the population of Sarkot, situated at 7,000 feet on a high easterly spur of the great mountain Duder Ka Toli in patti Lobha, and also to a village near the source of the Kosi in patti Borarau, Kumaun proper. In 1847 a village, 15 miles west of Almora, situated among the pine forest of Siyahi Devi range, was attacked, and in the latter end of 1848 a few villages along the fatal line of the Pindar river were threatened with a return of the disease. During the rainy season of 1849 it broke out with great virulence in patti Chaprakot, pargana Chadpur, and proved very fatal in the villages of Marora and Dadoli, and the Senior Assistant Commissioner of Garhwal, Mr. Strachey, now Sir John Strachey, in a report, dated 22nd December 1849, gave particulars of the outbreak. Mr. Strachey writes—"For about 30 years past there has existed in Kumaun and Garhwal a disease known by the local name of *mahamari*, apparently identical with the plague of Syria and Egypt, the characteristic symptoms being violent fever of the most contagious nature, always accompanied with swellings in the armpit, the disease ordinarily seeming to reach its crisis on the third day."

11. Dr. Renny on the 9th May 1850 commenced a local investigation into the disease at Dadoli village, patti Chaprakot, and saw two cases on the 10th and two more cases on the 13th. He described the disease as an infectious fever of a malignant kind and of a typhus character, accompanied by glandular tumours and generally terminating in death in three or four days. The mortality from the disease in 1849-50 was 113 in nine villages.

Mahamari was again prevalent in 1851, and in a joint report on the disease, dated 1st December 1851, by Dr. Pearson and Sub-Assistant Surgeon Sri Nath Mukerji, it is described as typhus fever of contagious and infectious type. In a subsequent report, however, dated 17th May 1852, on the continuance of the disease into April and May, these officers, after extended observations, recorded the opinion that the disease was plague, associated with characteristic glandular swellings and distinctly contagious in its nature. It still existed in August of that year. There was an ascertained total of 633 deaths during the epidemic of 1834-35, and in 1851-52, 567 deaths were recorded in 77 villages.

In 1852-53, Drs. Francis and Pearson were actively engaged in the investigation of the disease and recorded the *post-mortem* appearances in four cases of which the principal were congestion of the brain, a diseased condition of the blood, and effusion into the serous cavities.

12. *Mahamari* descended to the plains as late as 1853. In that year it appeared in an epidemic form in the towns of Thakurdwara and Afzalgarh and in the district of Moradabad. Dr. Stiven, Civil Surgeon of the district, reported on this outbreak in the plains. "It seems," he states, "that in December 1853, Ali Bakhsh, a resident of Mehidpur, a village in the Bijnor district, between Thakurdwara and Afzalgarh, where the disease was prevalent at the time, went to the latter town to see a *nautch*; that he returned to his home in Mehidpur; and that three days afterwards his brother, Muhammad, became ill and died on the third day of his illness. Ali Bakhsh's cousin also took ill and died in three days, having had, as described to me, swellings of the glands in the groin. Ali Bakhsh's wife and sister living in the same house also died." Dr. Stiven attributed the origin of the disease to contagion brought by Ali Bakhsh in a latent form from Mehidpur. Dr. Stiven referred to the fact that *paharis* brought down goods for barter to Chilkia, a very important mart near Kashipur, and surmised that the disease was introduced by hill people in intimate intercourse with the people of the district.

The disease was very prevalent also in Kashipur early in 1853, and lingered in the Moradabad district till 1854. Dr. Stiven saw a few cases which were characterised by high fever and swelling of the glands of the right groin or of the armpit. It also prevailed in Rampur at this time; and it is stated that about 8,000 deaths occurred from the disease.

Dr. Stiven's conclusions were:—

- (1) that *mahamari* is identical with the uncomplicated or simple form of glandular plague as found in Egypt;

- (2) that it can be conveyed to any town by contagion, and be propagated by endemic causes, as filth, bad ventilation, poverty and uncleanness of the inhabitants.

13. In September 1859 *mahamari* again broke out in the northern parganas of the hill tracts, and in 1860 it was noted that close upon 1,000 persons had died of the disease.

An outbreak of the disease occurred at Sarkot on 20th September 1870, and continued till the 9th of November.

14. Dr. Richardson in a report, dated 4th October 1875, on *mahamari* at Siti, patti Danpur-Bichla, after stating that the last of six cases occurred on 9th September, says that "the first victims were a little girl, aged 8, and her father, Kusalli, aged 30. They were attacked about 1,000 feet above the village of Siti and near the edge of the oak forest. Both were seized with fever, vomited once or twice, had large swellings in the groins, and both died on the fifth day after seizure. The bodies were thrown into a stream below. On the day the bodies were disposed of, two other persons living in the same building were attacked after disposing of the bodies and remained at Siti. They were taken or sent into the jungle and died there, and were buried where they died; but their graves must have been shallow, for their bones were afterwards found scattered about. Thus of the six deaths, four were among persons occupying the same building. The two last were Gujuali, aged 45, and Dhanali, aged 45, husband and wife. The next victim was a man, 28 years of age. He had severe fever for two days when large swellings were observed in the armpits. He vomited twice during the illness like others. He died on the fifth day and his house was burnt and the body with it. The last who died was a boy Mulaki, son of Dharam Singh. He was taken ill and died about a mile from Siti in the jungle.

Dr. Pearson, in a report, dated 22nd June 1876, states that he inspected villages in patti Bisaud, where 50 deaths from *mahamari* had been reported.

15. In November and December 1876 the disease was prevalent in certain villages in Kumaun and prevailed in Balt and Bintola within four miles of Almora and within five miles of Ranikhet. Dr. Planck inspected 40 villages affected by the disease, and recorded 277 deaths and confirmed the opinion that the disease was the pestis or plague of medical writers, and was readily communicable from the sick to the healthy. The villages included 9 in pargana Khas Parja,

12 in Bora-ki-Rao, 2 in Attargoli, and 17 in pargana Danpur, as follows :—

Parganas.	Villages.	Parganas.	Villages.
Khas Parja ...	Balt.	Attargoli ...	Bhandargaon.
	Bintola.		Dugora.
	Sirar.		Parsali.
	Nainoli.		Sungarh.
	Gajula.		Baret.
	Salla.		Nankori.
	Biraura.		Sama.
	Maichor.		Bandahar.
	Matoli.		Gaula.
	Banuri.		Bhamangaon.
Bora-ki-Rao ...	Tanda.	Danpur ...	Dor.
	Sajoli.		Chachena.
	Phalianti.		Birtang.
	Chain.		Darkot.
	Behta Talla.		Alam.
	Kausani.		Bothi.
	Kajuli.		Basankot.
	Mangalta.		Kasiabara.
	Ajula.		Gadera.
	Tailihat.		
	Kururah.		

Return of deaths from mahamari, 30th June to 16th July 1877.

District.	Pargana.	Patti.	Village.	NUMBER OF DEATHS REPORTED.			
				Men.	Women.	Children.	Total.
Kumaun ...	Baramandal ...	Athagali ...	Bhandargaon...	...	...	2	2
	Danpur ...	Danpur Talla,	Gadera ...	1	1	...	2
			Total ...	2	2	2	4

The Commissioner of the Kumaon Division, writing under date the 19th July 1877, says the recent epidemic seems to have come to an end, and states that the area affected has been in Garhwal, the parganas of Nagpur, Chandpur, Budhan, Chandkot, and Dewalgarh, and in Kumaon the parganas of Danpur, Johar, and Baramandal, the total deaths up to date being 535.

District.	Men.	Women.	Children.	Total.	Remarks.
Kumaon ...	105	69	64	238	Last report, 20th June, 1 death.
Garhwal ...	199	73	25	297	Ditto 24th July, 5 deaths.
Total ...	304	142	89	535	

Return of deaths from mahamari, 3rd April to 14th May 1878.

District.	Pargana.	Patti.	Village.	NUMBER OF DEATHS REPORTED.			
				Men.	Women.	Children.	Total.
Kumaon ...	Baramandal	Khasparja...	Bhulyara ...	3	3	...	6
	Ditto ...	Ditto ...	Binola ...	1	2	1	4
			Total ...	4	5	1	10

16. Dr. Richardson reported that typhus fever, identical with *mahamari*, prevailed more or less throughout the year 1884 in the Kumaon Division, and in 1885 he visited certain villages, Sirka, Rung, etc., in patti Chaudans, pargana Darma, where the disease had been prevalent.

17. In 1886 the same officer visited villages in patti Giwar, pargana Pali, in which 13 deaths took place from the same cause, and was informed on 13th October that 10 persons had died of *mahamari* in Serl, Danpur. He noted also that "a great number of deaths from *mahamari* took place in Garhwal during the year 1886." Dr. Thomson also reported on the outbreak of *mahamari*, identical with typhus fever, in April and May 1886, but the reports of these outbreaks are very meagre.

On the 28th March 1887, the disease was reported at Khatiari adjoining the military station of Almora. On the 5th April, at Gonja Jali in Bhabar Chhakata, on 27th May 14 deaths were reported from Bijapur village, patti Dora Mulla, pargana Pali, and on 14th June three deaths in Nakutta village, patti Tikhun Mulla. The Collector

of Kumaon on the 11th October 1887 gave a summary of deaths from *mahamari* in Danpur as follows :—

Date.	Name of village.	Number of deaths.
24th August to 27th September	Dasauli in Pungraun	37
30th September	Lohathal do.	3
4th to 29th September	Surkali in Nakuri	7
29th to 30th	Ghali	3
	Sugroll	1
	Total	45

Dr. Thomson, who reported on this outbreak on 13th June 1888, states that the first case at Dasauli occurred in the person of one Gungia Patak, who it is stated recovered. The first case noted in the neighbouring village of Lohathal, on the 18th September, was in the person of a resident of Dasauli. A second case took place in the same house in which two more persons died in October.

An outbreak occurred at Gangoli, Kumaun, on the 4th October.

Under date the 24th October the following deaths from *mahamari* were reported :—

Date.	Name of village.	Number of deaths.
8th October	Lohathal in Pungraun	1
9th "	Dasauli do.	10
12th "	Surkali in Nakuri	1
13th "	Dhari "	1
	Total	13

On the 2nd November five more deaths had occurred from the disease in Dasauli, and on the same date four deaths in pargana Chaugarkha, Salan Talla. On the 19th November 14 deaths from *mahamari* were reported between 24th and 31st October in Dasauli village, patti Pungraun, pargana Danpur ; and on the 5th December *mahamari* had again made its appearance, one death being noted in Surkali, patti Nakuri, pargana Danpur.

On 29th March 1888 two fatal cases were noted in Kaurea near Dasauli, and on 5th April a woman died of the disease in Khitauli, and on 8th idem the husband of the woman died. On the latter date a boy died in Lohathal. The house in which former cases had occurred had stood empty for some months, the owners living a short way off in chappars. But this boy knew of the existence of "*gur*" in, and was observed taking some from, the house. On May 9th two deaths occurred at Singor.

A death from *mahamari* in village Lagor, patti Pungraun, was reported on the 15th May 1888 ; and the disease was said to be present in Uskot and Rithagarh, pargana Chaugarkha, at same time.

Dr. Thomson in his report of the outbreak states that the disease was *mahamari*, *gola rog* or *phutkia*, hill plague, or a severe type of typhus fever highly contagious and bred and fostered by filth. On the 13th September 1888 a statement was furnished by the Senior Assistant Commissioner, Garhwal, showing that five deaths from *mahamari* had occurred in Nagpur, and 16 in Dewalgarh mortuary circles, five in Badhan and two in Nagpur.

18. The history of the disease in its incidence among the people of the hill tracts from 1887 onwards is imperfect, owing, it is presumed, to the confusion arising from adopting the view that *mahamari* and *sanjar*, or typhus fever, were identical diseases.

19. No cases of *mahamari* were reported in Garhwal or Kumaun in 1889 or 1890. In 1891 six deaths from the disease occurred in patti Karrakot, pargana Badhan, between 27th June and 21st July (two deaths in June and four in July). The record is blank in 1892.

20. In 1893 two limited but associated outbreaks of *mahamari* occurred, in July and September, in mauzas Surkali and Suni, patti Nakori, pargana Danpur, a few miles off the Bageswar-Berenag road and about two marches from Bageswar.

The first outbreak occurred on the 8th July, and the second on the 13th September, and these outbreaks were associated, and each case was connected with some other preceding case or cases.

The extremely infectious and fatal nature of the disease is evidenced by the fact that it was communicated direct from the sick to the healthy, and that all those attacked died.

The affected families in both outbreaks occupied houses situated in a large gently-sloping horseshoe-shaped valley, at an elevation of about 6,000 feet above sea-level.

The houses in the locality are dotted round the upper margin of an extensively cultivated and terraced area, and form no collection that can be called a village.

The families affected were comparatively well-to-do people, and poverty or destitution had nothing to do with the outbreaks. The site and natural surroundings of the dwellings are exceptionally healthy; and the families undoubtedly lived in a naturally and exceptionally healthy climate, but under conditions which favoured the onset and dissemination of zymotic disease in its most intense form.

These two families occupied the end rooms of an isolated block of three houses, the centre house having remained empty for the previous six months, and the families had been resident in Surkali for years.

The first case occurred in the person of a girl whose father, it is stated, died seven years before of the same disease; and of the two whole households of Kuna Sah and Ratan Lal, which were affected, all the members, numbering eleven souls, succumbed to the disease.

Mahamari in patti Nakori, pargana Danpur, in 1893.

Place of occurrence.	Girl.	Woman.	One person.	Two persons.	One person.	Two persons.	One person.	One person.	One person.
Mausa Surkali.	Persons, Banias.								
	Date of attack, 8th July, 10th.								
	Date of death, 10th "	11th,	14th,	15th,	16th,	17th,	1st,	2nd,	3rd August.
		July.							
		On the 17th August Tejgir helped to fire the shed in which the dead bodies lay.							

Mausa Suri.	Persons, Jogis.	Tejgir.	Monagir.	Gopalgir.	Fernia.
	Date of attack, 1st "	September.	17th.	22nd.	22nd.
	Date of death, 18th "	"	31st.	30th.	29th.
		Punagrir visited Tejgir when the latter was ill of the fever.			

Mausa Maghera.	Person, Jogi.	Punagrir.
	Date of attack, 15th.	15th.
	Date of death, 15th.	15th.

The persons who succumbed in the mauza Surkali comprised the members of two whole households those in mauza Sinhi were of one

family, and Panagir of Mauza Maghera was a caste-brother of Tejgir. Panagir visited Tejgir on the 13th September while the latter was ill of the fever, and returning to his home five miles away on the further side of the Pangra river, was seriously ill the next, and died the following day.

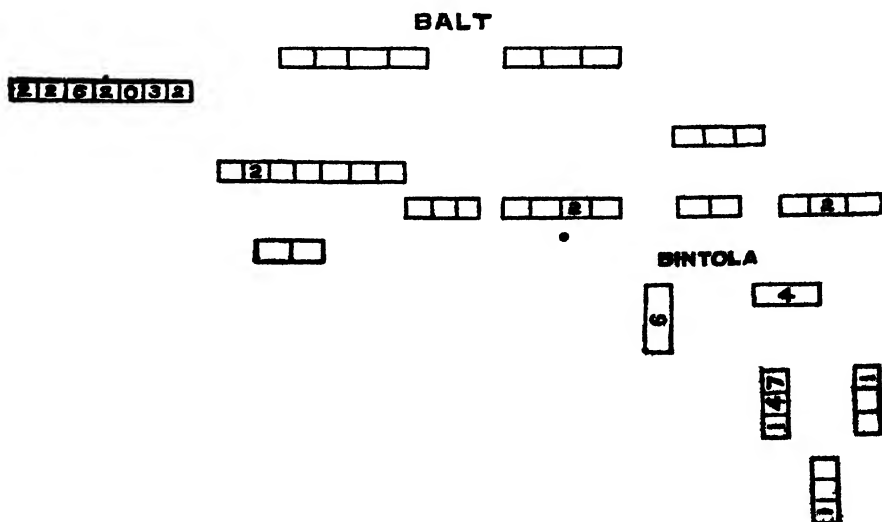
The inhabitants of Barkuri, separated by a spur of a hill from Surkali, vacated their village on the 22nd July on account of a great mortality among rats and mice, and an outbreak of *mahamari* was thus in all probability averted.

21. In 1894 five persons died of the disease at Ira, patti Chaprakot, Garhwal, between the 5th and 8th January, and there were two more seizures, and between the 3rd and 4th May a girl and a boy were reported to have died of the disease at Gadoli, patti Daijuli, pargana Chandpur, but Dr. Giles was of opinion that these deaths might have been due to famine fever.

22. A description of a Kumaon hamlet and the terrible effect among the people, and of the calamity which often befalls many a household on the outbreak of the plague, may be best given in the words of one who personally observed the scenes and recorded his experiences of the extended outbreak in 1876-77.

"Balt and Bintola are two adjoining hamlets situated rather low down in a valley about four miles north-east of Almora.

"The houses are well built of stone, with solid roofs of thick hill slate. They are arranged in short terraces on the hillside, in accordance with the following ground plan, Bintola being lower placed than Balt. In the plan each square represents a house, and the figure, the number of deaths which occurred in the family inhabiting the house:—



"The people of Balt and Bintola were friends; they had intermarried, and relatives of many families lived part in Bintola and part in Balt; and the two villages might be considered one."

Mahamari first appeared in Bintola early in November 1876, in the person of a child of the padhan or headman of the village. The child died on the third day after it sickened, and while it was sick two other children of the same family were taken ill and also died. In the two houses which formed the homestead of the padhan, before the sickness commenced, there resided a family of fourteen persons in all. Of these fourteen persons, thirteen died at intervals during November and December, all with the same symptoms of disease, commencing with shivering, quickly followed by intense fever, ending in delirium, insensibility and death on the third or fourth day.

In the terrace of three houses adjoining the padhan's home, three families resided containing a total of fourteen persons. The women of these families helped to nurse the sick of the padhan's family, and during November and December twelve of these fourteen persons died of the same form of disease.

At first the sick were nursed and died in the houses, afterwards the sick were nursed and died in temporary huts outside the village, and all the bodies were buried after death. In all, thirty-one cases of the disease occurred during November, December and January, and 27 persons died. The four persons who recovered presented themselves to me on the 24th January for examination. All had the same appearance of extreme debility with emaciation, and one had a small bubo in the left axilla, which appeared on the sixth day of his illness seven days ago, and is now soon likely to suppurate, being hot and tender. Bubo was noticed both in the axilla and inguinal regions in some other of the later cases, but in none of those who died quickly at the first outset of the disease. And it was only after the bubos were seen that the people knew they were suffering from an outbreak of gola, the name given by the hill people to the disease. No appearance of bubo occurring in the first rapidly fatal cases, the people thought the disease was sanjar, a form of continued fever common amongst the hill people and frequently fatal, but believed to be less contagious, and therefore less dreaded than gola.

From the time the people vacated the site to live in temporary huts or in caves on the hillside, only one death occurred, as will be hereafter described.

In Balt the first case occurred in the person of a woman named Bani, who had gone to the padhan's house at Bintola to assist in nursing the sick children there. She resided and died in one house of a terrace of seven in the upper part of Balt; next, her daughter died; then four persons died in the adjoining house; then her husband died, and the disease spread through the terrace; so that deaths occurred

in every house excepting one, which was untenanted. In all, 13 persons died in the terrace during December, and then, as at Bintola, the people of the villages vacated their houses so soon as "gola" or bubo was noticed as a symptom of the disease in those who lived beyond the fifth day. Indeed, deaths from gola being reported, the civil authorities directed the people to vacate their houses, and they located themselves in huts of grass and branches on the hillside. All remained well until, a great fall of snow occurring on the 14th of January, the people returned to their homes; and during the succeeding five days, four more deaths occurred in the houses of the terrace previously effected. The people, seeing this return of sickness, fled at once to the hillside, leaving the sick who died unattended in the houses.

The local conditions at Balt and Bintola were as follows:—"Both villages were uninhabited, the former inhabitants scattered in families miserably lodged in huts or caves far off; the village cattle roaming and feeding amidst the young wheat of the cultivated terraces around and below the villages. The torn remains of thirteen cows, calves or bullocks, and five goats, scattered in different places, witnessing to the truth of the local statement that, from dread of the disease, no one dare venture on to the site to house the cattle as night approached, and that consequently leopards and hyenas were devouring the flocks.

"The houses were double storied, one room below and one above, close, unventilated tenements. The lower room was used as a cow-house, the upper room for family occupation. In the lower room, about five feet high, it had been customary to lodge from four to eight head of cattle or goats at night, and, indeed, in some instances as many as the room had standing place for; the only opening being the small doorway of entrance, tight closed and barred at night. These rooms were seen to be littered for about a foot in depth with decaying straw and much manure, moistened by the fluid excretion of cattle, and the entrance way on each side, and the stone platform facing the lower storey, were piled with heaps of manure, which had been drawn out of the lower room as necessity required, and there left for eventual removal to the land in the ploughing season. The upper room was noticed to be roughly divided by wooden slabs into a front and back portion; the former used as the family sleeping place, the latter as a granary. The doorway, and in some instances a round hole in the front, and a small round hole for the exit of smoke through the roof of the house, all commonly closed at night, being the only openings. The floor was made of thin wood, with pretty numerous cracks, so that the warmth generated by the cattle below could reach to the sleeping people above, afterwards locally described as a beneficial arrangement.

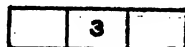
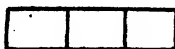
"Upon the stone platform facing the terrace above mentioned lay the broken remains of the four persons who had last died, their limbs and skulls torn and scattered by jackals.

"As regards the site generally, and the precincts of the villages nothing naturally insanitary could be seen. With the exception of a grove of pine trees at one place, the sharply sloping surface was clear of excessive vegetation everywhere. A mountain stream of bright water flowing between the village sites furnished an ample supply of good water for domestic purposes. Above the village sites all was clear, open rocky ground; around and below the sites almost all the surface had, by the patient industry of many years, been fashioned into narrow terraced fields, spreading down in green steps of young wheat and barley to the margin of the rocky stream flowing in the very bottom of the valley."

Alam is another village of about 12 houses, high placed in the precipitous mountainside above the Gori river. To reach it from the Gori valley side, the river, a boiling flood of snow water, has to be crossed by means of a cradle sliding on a rope, the apparatus being temporarily provided for the use of the visitor.

The houses are placed on the mountainside in the following order:—

ALAM.



Alam was inspected on the 12th of May 1877. In all, eight deaths in two families occurred here from gola disease, the following being the history of the outbreak:—

"The disease commenced in the padhan's family with the illness of the padhan's brother, who came home ill with fever from a shooting excursion on the 4th of March, and died on the 7th, swelling appearing in his groin before he died. In this family the wife of another brother and her child died during the period between the 7th and 23rd of March, and in both cases bubo appeared as a symptom.

"The man who first died lay sick, was visited several times by a man who had recently come from Askot to settle with his family in three attached houses, highest placed of any in the village. This Askot man was taken ill on the 11th and died on the 16th of March, a swelling appearing in his armpit before he died. He died in his house attended by his wife, who buried his body just outside the house door. Three days after he died his wife was taken ill, and died after four days' illness; and her body was left in the house unburied. The five remaining members of the family, four boys and one girl, fled to a neighbouring hut, where they lived together for a few days, the eldest, a boy of 14, acting as head of the family and providing food for the rest. This boy feeling himself ill, returned into the house alone and died, his body also remaining in the house. Four children remained, the eldest, a girl of nine named Danuli, and her three brothers aged, respectively, 7, 5 and 1½ years. Danuli worked for and fed them all for a few days, and during this period the boy of 7, wishing to take honey from a hive in the house, entered it with burning straw or wood to drive the bees away. Either from carelessness, or as the result of fright at seeing the dead bodies, he set the house on fire; and all three tenements were burnt down. A few days after the house was burnt down, the boy of seven was taken ill and died in the hut; and his death was followed by that of the boy of 1½, after an interval of some days. So that Danuli and one brother only were left.

"Before reaching the village on the 12th of May, I had been informed that possibly children might be found there abandoned. The village was found empty and desolate, and Danuli and her brother were found near the place of temporary abode outside the village, the former, a bright-eyed little girl dressed in an old petticoat, the latter a little urchin wrapped in a piece of old blanket. These children had lost their parents by the 20th of March, and from that date had been thrown on their own resources, except for a few days while the elder brother lived, for no person of the village would approach them.

"The girl Danuli recounted, in disjointed sentences, her experiences of the past eight weeks. Explained how her father, mother and big brother had died; how all the people ran away out of sight; how the house had been burnt; how her brother of seven had died and his body been carried away by jackals in the night time; how she had buried her little brother of 1½, taking the body in a basket and digging a trench for it with a pick; and lastly, how she had been left only with the remaining brother, husking and cooking rice for both every day, leading her brother down to a stream to drink and sleeping with her arms about him every night. Even now that

so long a period had elapsed since the last person had died, no native person present would approach these children, who sat hand-in-hand, apart, as the girl told her pathetic tale of suffering and endurance.

"The two children were taken down the mountainside to a stream in which they were washed, their clothing was burnt, and they were re-clothed and provided with blankets. Afterwards they were passed in the cradle across the Gori, and given in charge of their grandfather, who was much moved at sight of the children and promised to care for them in his village on the mountain opposite Alam."

Such is the history of many a household during the occurrence of the plague, which exists to this day in British Garhwal and Kumaun.

23. The ever-recurring recrudescence of the plague in this portion of the Himalayas may be ascribed to the ingemination of a specific poison, and its spread by fomites, and other means through neglect to destroy articles, etc., likely to convey and retain infection for long periods and to the imperfect burial of the dead in epidemic and at other times. The accidental uncovering of a grave, disturbance of soil, etc., or the unearthing of a long neglected or hidden household article, may undoubtedly let free the specific poison just as the special communicable poison of scarlatina, small-pox, etc., may be wrapped up in a dirty rag or other article for years.

24. The cause of the disease, however, is still obscure. It has been ascribed by Dr. Watson to the eating of diseased brain, especially to the use of "mandua" (*Elusine coracana*), and the fact that the rats and mice have access to grain stores and die of the disease often prior to the outbreak among the people seems to have confirmed him in his belief, strengthened by the supposed fact that a quantity of diseased mandua sent from an infected village to be ground at a water-mill caused the death of all rats about the mill. Others have ascribed the disease to the use of chua (*Amaranthus frumentaceus*), and it is where this grain is chiefly used or forms the staple food of the people that the disease first breaks out. However, Doctors Francis and Pearson have pointed out that the villagers on abandoning an infected village take their supplies of grain with them, and that the pestilence is usually stayed although the food-supply is the same as when the people occupied the infected locality.

Doctors Francis and Pearson fully investigated the point and satisfied themselves that Doctor Watson's supposition could not be supported by properly authenticated facts,

25. Light has lately been thrown on the etiology of the disease by investigations into the occurrence of the recent epidemic at Hong-kong. The confirmation of the fact that a special organism exists in the blood and tissues of those affected by the disease seems to indicate that a special bacillus is the cause of plague. The demonstration of its abundance in the inguinal glands of the affected and of the rapidly fatal effect of the inoculation of the micro-organism (an encapsuled diplococcus, difficult to strain by the usual reagents but easy to cultivate on gelose) on rats, mice and guinea-pigs would seem to point to a definite conclusion. It only remains for us in the North-Western Provinces on the next appearance of the disease in the Himalayan hill tracts to confirm such conclusions, by demonstrating the presence or non-presence of the newly-discovered bacillus in connection with the disease as it occurs among the people of British Garhwal and Kumaun.

26. Mahamari has been fostered by the uncleanly and filthy habits of the people of the hill tracts who house cattle, sheep, goats, and other animals on the ground-floors of their unventilated houses and allow accumulations of sewage, refuse and litter in the immediate vicinity. They also defile and pollute the neighbourhood of the village in defiance of all sanitary law, and in their helplessness permit refuse and noxious weeds to fill the air with rank odours, adding to the foul emanations that penetrate every nook and corner of the overcrowded impure dwelling which forms a nursery of zymotic disease and is the birthplace of the pestilence.

27. The remedial and preventative measures, as embodied in the rules for the prevention of Mahamari, comprise—

- (1) The housing of all cattle, goats, sheep, etc., in the sheds at a distance of not less than 50 feet from the village, the sheds being located below the village if possible.
- (2) Attention to the ventilation of houses and the prevention of overcrowding by the distribution of families in different rooms.
- (3) The prevention of nuisances in or near the village.
- (4) The clearances of accumulated filth, manure heaps and rank vegetation from within and around the dwelling-houses.
- (5) The preservation of the water-supply from pollution and contamination.
- (6) The evacuation of infected houses and of the village on the death of rats or mice in observable numbers, or on the occurrence of the disease among the people.

- (7) The destruction by burning of bedding, clothing of the infected and the proper cremation of the dead of the disease ;
and
- (8) The destruction by fire of the house, together with any article likely to convey or retain infections in which a death from Mahamari has occurred.

28. Continued immunity from Mahamari in an epidemic form makes the rising generation, as Sir Henry Ramsay wrote in 1882, underestimate the danger "arising from the continued presence of this preventible disease."

It is still necessary to emphasize the need for increased watchfulness and for maintaining the strictest sanitary precautions to prevent the disease from assuming undue proportions in the hill tracts. Otherwise its incidence might even yet prove disastrously fatal among the overcrowded communities of our hill sanatoria, within a few miles only of the locality of the ever-recurring pestilence.

DR. STIVEN'S REPORT.

No. 5.

(Indian Annals of Medical Science, No. III, October 1854.)

As one of the leading objects of the conductors of the "Annals" is to record the progress of epidemic disease in India, we return to the deeply interesting subject of Mahamari, upon which an article appeared in our last number. The present contribution to its history, although brief, is highly important, in announcing the fact of its having extended from the hilly regions to the plains. We are indebted for this addition to our knowledge of this mysterious disease to Dr. Stiven, Civil Assistant Surgeon of Muradabad, whose official report upon the subject has been published, and from which we proceed to extract all that is likely to interest our distant readers, but more especially those points which refer to the contagious transmission of the malady.

In the paper on Mahamari in our last number, it will be remembered that its history was brought down to the close of 1852, at which time, after a year of unexampled fatality, it was still existent in Kumaon and Garhwal. In February, 1853, we find it committing great devastation in Rampore, and in a milder form in Kasheepore, both situated in Rohilcund, an extensive plain adjoining the Kumaon hills continuing for a brief period only. As we consider, however, the progress of epidemic disease from place to place as constituting

one of its most interesting characteristics, we shall give the description in Dr. Stiven's own words :—

• “In accordance with the instructions contained in his letter, I at once proceeded to Kasheepore and ordered the Thanadar to make strict inquiries through the medium of the chowkidars and burkandazes, as to the localities in which the sickness prevailed, and that when this was done, I would proceed with him and visit all the infected houses.

“In the meantime Mr. Wilson arrived from his camp in the neighbourhood, and afforded me every assistance in his power, accompanying me through all the streets of the town. We saw a few cases of sickness, three of which were fever, in two of these swellings of the glands to a slight extent was observable, in one those of the right groin were affected, in the other those of the right armpit; in consequence of not having seen any more cases, either during my stay at Kasheepore or having received any intimation of others having occurred afterwards, I gave the following opinion in my report sent in then.

“There was nothing to show that these swellings were so connected with the disease as to lead to the supposition that the cases were in the least analogous to Mahamari, as reported.

“Further experience has led me to form an opposite opinion from the one then expressed, and I now firmly believe that these two cases of supposed fever were cases of “Mahamari” modified by the diluted nature of the infection (if I may be allowed to use such an expression), and that the “*vis medicatrix naturae*” was sufficient to overcome the disease in the absence of all medical treatment. I need not recapitulate what I then wrote in regard to the filth of the town, etc.; it is sufficient to say that measures were taken to cleanse it and its environs, and that no other cases were heard of in 1853.

“I may, however, add that the Thanadar did not report the circumstance of sickness being prevalent in sufficient time, in fact until it had all but ceased to exist.

“If I had known of it at once, it is very likely that I would have seen cases of pure “Mahamari” and might have been able to have traced the disease to Chilkeea—a very important mart for hill produce, and where the Kasheepore buniahs are in the constant habit of going to barter their goods for these articles brought down by the paharis, causing, of course, intimate intercourse with each other.

“I might thus have been able to show that contagion was the “*prima causa*” of its breaking out, and that it was propagated by the filthy state of the whole town.

“In the appendix, my report of Kasheepore sickness will be found,

"I now proceed to the consideration of the disease as seen in 1854, and the first we hear of it is from Colonel Platt, Commanding 23rd Native Infantry in Moradabad, who stated while out shooting in the neighbourhood of Afzulgarh in the Bijnour district, the natives reported to him that a fatal sickness, or "waba," was prevalent, and carrying off numbers of the people.

"He at once sent for the Thanadar of Afzulgarh, and asked him if he had reported the circumstance, and on his answering in the negative, he ordered him to do so at once to the Magistrate of Bijnour, who immediately reported the circumstance to the Commissioner of the division (Mr. Dick), and he, without delay, made the circumstance known to me, and I immediately took measures to afford relief to the sufferers by sending out my best native doctor (who had been previously selected by Dr. Renny to accompany him into Kumaon, and who consequently had seen Mahamari) to the "Qusbah" to ascertain the nature of the disease, administer medicine, and report to me.

"I also attach a copy of my report then sent in on the Afzulgarh sickness.

"I now, in conclusion of this part of my subject, come to discuss the history and causes of Mahamari, as seen by myself in Thakoordwarah.

"I arrived there on the 19th March, in accordance with instructions received from Mr. Roberts, the Magistrate of this district, and immediately sent for the Tehsildar, to ascertain from him the nature of the disease, and also to give orders to the different chowkidars to ascertain where the sick lived, and I would then accompany them to the different dwellings.

"In the afternoon I proceeded for this purpose and saw a number of cases of "Mahamari," two or three of which I have selected for detailed report in the appendix, from notes taken at the bedsides of the patients.

"In the evening I was able to gather the following information in regard to the history of the disease.

"It seems that in December 1853 Ali Buksh, a resident of Mehidpore, a village in the Bijnour district, between Thakoordwarah and Afzulgarh, where the disease was prevalent at the time, went to the latter town to see a nautch, that he came back to his home in Mehidpore, and that three days afterwards his brother Mahomed became ill and died on the third day of his illness. Ali Buksh's cousin also took ill and died in three days, having had, as described to me, swelling of the glands in the groin, with great heat and pain. Ali Buksh's sister living in the same house also died.

"These three deaths occurred within eight days from the time Mahomed took ill. Boodha, the brother-in-law of Ali Buksh, living in Thakoordwarah (where also Ali Buksh's wife resided), got alarmed in case Ali Buksh should also get ill, and went off to Mehidpore and brought him to Thakoordwarah ; 15 days after his arrival a brother of Boodha's took ill, with all the symptoms of Mahamari, accompanied with swelling of the glands of the neck, which proved fatal in three days from the first attack. Boodha's sister (Ali Buksh's wife) also died about a fortnight after, and Ali Buksh then went to his home at Mehidpore, four days after the death of his wife, took ill, and died on the third day of his illness.

"We have thus the history of the introduction of the disease into Thakoordwarah, as I have it on the evidence of the Tehsildar and the man named Boodha, who could have had no objection in deceiving me, in fact it was to be expected (from the fear generally prevalent in a native's mind on any European inquiry being set on foot, that something is going to happen to him), that he would deny everything about his brother-in-law having come to live with him rather than without reserve give the unvarnished tale of woe just described.

"These were the first cases that occurred at Thakoordwarah itself.

"Again on further inquiry I found that a girl, daughter of a Sonar, came from a neighbouring village to Thakoordwarah, took ill, and died of Mahamari ; that Beharee, a Buniah, her uncle, went to her funeral and assisted in carrying her corpse ; after coming home from the performance of this duty, he took ill, with shivering and all the symptoms of fever, followed by swelling of the glands of the left armpit, and died on the third day of his illness.

"Beharee's wife was then seized and died in five days afterwards ; no swelling of the glands, however, were observable in this case.

"We have found that Boodha's house is in Thakoordwarah, but near to Jumna Wala, and that Beharee lives near Boodha, but in Jumna Wala.

"We have then Boodha's house as the focus of the contagion, or infection, or both, and from this point it spread over Thakoordwarah, curiously enough, however, choosing the most populous, crowded, ill-fed, filthiest parts of the Qusbah for its development.

"To let this be better understood, I may state that the Qusbah consists of four mouzahs, *viz.*, Thakoordwarah, Jumna Wala, Futteh Gunge and Mahomed Gunge ; we know that the two first are the most populous and that a greater number of the very poor live in them ; that consequently there is greater crowding and infinitely more filth both in the different mohullahs and in the enclosures attached to the different houses.

"On the other hand, Futtch Gunge is well ventilated, the streets are open, the houses detached and gardens interspersed between the dwellings of the inhabitants, and in Mahomed Gunge the population is very scattered and the houses few.

"We find consequently that only one case of Mahamari, as far as I can learn, broke out in these latter mouzahs, and that the man affected with the disease recovered (*vide* appendix). In my Afzulgarh report I mentioned the advantage of gardens attached to villages and towns as a means of disposing of manure, etc., and a practical illustration of the advantage of this plan is shown in the above case of Futtch Gunge, and it would be well if it could be carried out to a greater extent, as a sanitary measure.

"I think then from the foregoing remarks, we may attribute the origin of the disease to contagion brought by Ali Buksh in a latent form from Mehidpore, and that the disease propagated itself by such an infection engendered by the extreme filth accumulated in and around the dwellings of the inhabitants.

"In reference to paragraph 25 of the preceding remarks, I may state, as a curious fact, that in the original '*ursee*' sent in by the Tehsildar of Thakoordwarah, he mentions that small-pox had been very prevalent in and around Thakoordwarah in conjunction with Mahamari.

"We have thus traced the etiology of this disease as far as opportunity has afforded, and on comparing it with that of plague, the difference is scarcely perceptible.

"The introduction of the disease into Kasheepore is supposed to have been caused by two men affected with it going from Thakoordwarah to the former town. I am not, however, in possession of any facts that can be relied upon, but if we consider that Kasheepore is only about seven miles distant from Thakoordwarah, it is easy to conceive that the disease might have arisen from this source.

"In conclusion I may mention that I hoped to give the history of the disease as it occurred in Rampore in 1853 (having written to the Nawab on the subject); however no answer has yet been received, and I consequently cannot delay the transmission of this report any longer by waiting for his reply.

"Native reports mention that the people attacked threw up blood almost on the first onset of the disease, and died a few hours afterwards; if this account can be depended upon, then we have here the description of the "Black Death," or worst form of plague, described by Heeker in his epidemics of the middle ages.

II.—Nosological character of Mahamari.

"I shall make a few very brief remarks on this topic, as much has been elicited in regard to its symptoms, etc., in the foregoing division of this subject.

"Dr. Renny describes the disease in the following words : heat of skin, accelerated pulse, lassitude, chilliness, nausea, thirst, a white and furred tongue, were all noticed ; "headache was prominent in all." The external swellings suddenly rising indolent, and not very painful, are the most characteristic proof of the malady, glandular swellings in various parts of the body, the groin, axilla, neck and even in the legs, are described as occurring. Again he states the most remarkable circumstance in the disease is the mild nature of the entire symptoms under so rapid a termination * * * trifling derangement of the functions of health would be a startling and unaccountable anomaly, and not to be reconciled with speedy fatal result, had not the same thing been observed in other epidemics in India, and even in the plague itself.

"Dr. Pearson describes the symptoms of the disease as follows—chilliness, giddiness, unusually severe headache, pain and throbbing of the temples ; trembling of the limbs, unable to remain in the erect posture, great prostration of strength, fever continued, thirst, tongue foul, chalkey white, eyes heavy, watery and injected, breathing hurried, pulse small, frequent and unequal, nausea, vomiting and purging of bilious matters, urine high-coloured, clammy perspirations, heat and burning of præcordia, occasionally yellowness of the skin, and eyes wandering, delirium, bubos in the groins, glandular swellings in the axilla, or neck carbuncles, petechiæ expectoration of blood, convulsions, coma, terminating in death on the third or fourth day."

Much of Dr. Stiven's report is occupied in discussing the identities of Mahamari with the plague of the Levant. His observations tend to strengthen the opinion we expressed in our last number, that they are essentially the same disease. Some objection has been raised to this proposition on the ground of Mahamari being found to exist in temperatures, which are said to destroy it in Europe and Africa. But the thermometric limits of the plague are very undecided. Sir Gilbert Blane asserts them to be 60° and 80°, whilst Dr. Copland differs so widely as to name them 35° to 75°. Our certain knowledge of the meteorological relations of plague is at present very scanty. It has prevailed at Moscow, and although said to be limited in its southern march by Cairo, may possibly exist in Abyssinia ; with our present imperfect knowledge of the medical statistics of the countries,

south of Egypt, we are not justified in defining the limits of the disease.

Dr. Stiven institutes a very complete parallel of the two diseases, leading to the deduction that they are identical; and concludes by recommending certain measures for the relief of the sick, and the prevention of any further incursion of the disease into the plains, the former to be accomplished by means of branch dispensaries, and the latter by the formation of a 'cordon sanitaire' to be established along all the outlets from the hills of Gurhwal and Kumaon.

It is somewhat curious that whilst the value of quarantine as a measure preventive of the transmission of disease is losing ground in Europe, we still cling to it in India, under the influence probably of the good results which seemed to follow the establishment of the cordon sanitaire round Marwar and Meywar in 1836, as described in our last number, page 619.

We must confess to being amongst those who, impressed with a full conviction of the commercial difficulties attending quarantine, think that they had better still be continued than the life of a community be placed in peril. Until our epidemiological researches shall have fully satisfied us as to what diseases are communicable only by direct or indirect contact, what by atmospheric transmission, independent of human agency, and what by both combined, we shall respect a moderate and judicious system of quarantine.

APPENDIX III.

STATISTICAL STATEMENTS.

PAPER NOS.	CONTENTS.	PAGES.
1.	Reported plague seizures and deaths in Bombay Presidency and Goa from the beginning of outbreak up to the 27th August 1897 .	109
2.	Reported plague seizures and deaths in the City of Bombay	110—111
3.	Comparison of the weekly mortality in the City of Bombay from the week ending the 11th August 1896 onwards, with the weekly mortality during the corresponding period of the preceding five years	112—113
4.	Total reported plague seizures of different quarters of the City of Bombay	114
5.	Reported plague seizures in the different wards of the City of Bombay	115
6.	Reported plague seizures in the different quarters of the City of Bombay.	117—118
7.	Reported plague seizures in the Bombay Presidency.	119
8.	Reported plague seizures and deaths in the Bombay Presidency	121—122
9.	Reported plague seizures in the Bombay Presidency, showing separately imported and indigenous cases	123—124
10.	Reported indigenous plague seizures in the Bombay Presidency in the principal localities where the epidemic prevailed	125—128
11.	Reported plague seizures in Sind	129

STATISTICAL STATEMENTS—*contd.*

PAPER Nos.	CONTENTS.	PAGES.
12.	Reported plague seizures and deaths in Sind .	130
13.	Reported plague seizures in Sind showing separately imported and indigenous cases .	131
14.	Reported indigenous plague seizures in Sind in the principal localities where the epidemic prevailed	132
15.	Weekly comparison of reported plague seizures with mean temperature and humidity in certain localities where plague was epide- mic	133
16.	Reported plague seizures outside the Bombay Presidency and Sind	134

APPENDIX III.

STATISTICAL STATEMENTS.

No. 1. *Reported plague seizures and deaths in the Bombay Presidency and Goa from the beginning of the outbreak up to the 27th August 1897.*

Locality.	Population according to the census of 1891.	Number of plague seizures.	Number of seizures per 100,000 persons.	Number of plague deaths.	Number of deaths per 100,000 persons.	REMARKS.
BOMBAY PRESIDENCY PROPER.						
Bombay City ...	831,764	12,795	1,557	10,812	1,316	* These figures are the sums of the reported seizures and deaths. It is however known that especially during the early period of the epidemic the reporting of cases was not complete and that the actual number of cases was much greater than the number reported. During the period from the week ending the 1st September 1896 to the week ending the 20th April 1897 (inclusive) the excess of the total mortality of the city over that of the corresponding period of the previous five years was 30,828. After that period the reporting was more accurate and the general mortality of the city first sank below the normal and then rose above it, owing to an outbreak of cholera and other causes. Adding to the figure 30,828 the reported plague deaths from the 21st April up to the 27th August (inclusive) we obtain a total of 31,614 and this approximates more nearly to the actual number of deaths from plague. It gives a proportion of above 2,630 deaths per 100,000 of the population according to the last census. The accuracy of the calculation is to some extent vitiated by the fact that during the worst period of the epidemic the population was largely diminished by emigration. The Municipal Commissioner of Bombay made a calculation, based on total mortality and the estimated population of the city from month to month which gives a total number of 25,828 deaths from plague up to the end of July.
Mandvi Town (Catch State) ...	38,155	4,350	11,424	3,853	10,098	
Poona City ...	161,100	2,543	1,570	1,819	1,127	
Thana District ...	904,838	4,974	550	3,857	436	
Janjira State ...	81,780	287	358	164	201	
Surat District ...	649,980	2,154	331	1,632	251	
Kolaba District ...	509,584	1,320	261	1,172	230	
Nasari Division (Baroda State).	319,443	563	176	456	143	
Cutch State ...	520,260	840	161	640	123	
Poona District ...	906,410	1,186	131	836	91	
Satara District ...	1,225,989	1,170	96	844	69	
Ratnagiri District ...	1,105,926	377	34	316	29	
Palanpur State ...	645,526	167	26	104	16	
Ahmedabad District ...	921,712	163	18	96	10	
Nasik District ...	823,582	136	16	98	12	
Goa ...	7420,868	62	15	16	4	
Kolhapur State ...	913,131	127	14	100	11	
Savarnvadi State ...	192,948	25	13	24	12	
Kathiawar, including Amreli Division (Baroda State).	1,932,592	280	10	181	6	
Ahmednagar District ...	888,755	54	6	37	4	
Broach District ...	341,490	19	6	12	4	
Sholapur District ...	750,689	20	4	25	3	
Kadi Division (Baroda State).	1,098,742	30	3	24	2	
Khandesh ...	1,460,851	13	2	18	1	
Baroda Division (Baroda State).	817,023	12	1	12	1	
Kaira District ...	871,589	22	2	18	2	
Bhor State ...	155,060	3	1	2	1	
Mahli Kantha State ...	581,568	3	1	1	17	
Kanara District ...	446,351	1	22	2	22	
Belgaum District ...	1,013,261	2	19	1	90	
Dharwar District ...	1,051,314	2	19	1	99	
TOTAL FOR THE BOMBAY PRESIDENCY PROPER.	...	33,755	...	27,163	...	
SIND.						
Karachi City ...	305,199	4,181	3,974	3,398	3,230	† Population according to census of 1881.
Shikarpur District ...	918,497	905	109	699	76	
Hyderabad District ...	918,646	641	70	499	54	
Karachi District ...	459,681	238	52	178	39	
Upper Sind Frontier District	174,548	4	2	3	3	
Thar and Parkar District ...	298,203	3	1	2	67	
TOTAL FOR SIND	...	6,063	...	4,779	...	
GRAND TOTAL	...	39,818	...	31,942	...	

Reported plague seizures and deaths in the City of Bombay.

No. 2.

Period (week ending).						Seizures.	Deaths.	REMARKS.
1896.								
25th September	...	...	...	...	...	37	14	
2nd October	...	...	...	...	...	145	103	
9th	..	...	...	...	...	121	86	
16th	..	...	...	...	...	59	44	
23rd	..	...	...	...	...	101	63	
30th	..	...	...	...	...	67	64	
6th November	...	...	...	...	...	69	62	
13th	..	...	...	...	...	67	54	
20th	..	...	...	...	...	84	61	
27th	..	...	...	...	...	92	75	
4th December	...	...	...	...	...	149	107	
11th	..	...	...	...	...	303	224	
18th	..	...	...	...	...	373	271	
25th	..	...	...	...	...	403	295	
1897.								
1st January	...	...	...	...	...	536	357	
8th	..	...	...	...	...	489	326	
15th	..	...	...	...	...	578	373	
22nd	..	...	...	...	...	469	493	
29th	..	...	...	...	...	579	401	
5th February	...	...	...	...	...	730	617	
12th	..	...	...	...	...	813	847	
19th	..	...	...	...	...	847	89	
26th	..	...	...	...	...	765	730	
5th March	...	...	...	...	...	696	635	
12th	..	...	...	...	...	648	521	
Carried over	...	...	...	...	...	9,200	6,912	

Reported plague seizures and deaths in the City of Bombay—contd.

Period (week ending).						Seizures.	Deaths.	REMARKS.
Brought forward						6,912	6,912	
1897.								
19th March	...	...	...	...	...	530	488	
26th "	...	...	...	...	...	474	455	
2nd April	...	...	...	...	...	499	481	
9th "	...	...	...	...	...	445	363	
16th "	...	...	...	...	...	362	363	
23rd "	...	...	...	...	...	266	262	
30th "	...	...	...	...	...	227	169	
7th May	...	...	...	...	...	161	128	
14th "	...	...	...	...	...	100	81	
21st "	...	...	...	...	...	79	55	
28th "	...	...	...	...	...	75	47	
4th June	...	...	...	...	...	60	42	
11th "	...	...	...	...	...	59	21	
18th "	...	...	...	...	...	53	22	
25th "	...	...	...	...	...	28	22	
2nd July	...	...	...	...	...	17	12	
9th "	...	...	...	...	...	6	3	
16th "	...	...	...	...	...	8	11	
23rd "	...	...	...	...	...	14	9	
30th "	...	...	...	...	...	24	16	
6th August	...	...	...	...	...	19	8	
13th "	...	...	...	...	...	12	10	
20th "	...	...	...	...	...	28	21	
27th "	...	...	...	...	...	40	17	
TOTAL						12,795	10,813	

Comparison of the weekly mortality in the City of Bombay from No. 3. the week ending the 11th August 1896 onwards, with the weekly mortality during the corresponding period of the preceding five years.

Period (week ending).				Mortality during 1896-97.	Mortality during the corresponding period of the preceding five years.	Difference.
1896.						
11th August	...	...	...	561	502	59
18th "	...	...	...	606	506	100
25th "	...	...	...	635	541	94
1st September	...	...	...	629	508	121
8th "	...	...	...	563	494	69
15th "	...	...	...	580	459	121
22nd "	...	...	...	613	478	135
29th "	...	...	...	671	492	179
6th October	...	...	...	754	455	299
13th "	...	...	...	612	467	145
20th "	...	...	...	582	448	134
27th "	...	...	...	665	442	223
3rd November	...	...	...	642	414	228
10th "	...	...	...	597	421	176
17th "	...	...	...	666	434	232
24th "	...	...	...	726	420	306
1st December	...	...	...	742	432	310
8th "	...	...	...	1,032	431	591
15th "	...	...	...	1,284	445	839
22nd "	...	...	...	1,387	443	944
29th "	...	...	...	1,824	449	1,375
1897.						
5th January	...	...	...	1,693	474	1,219
12th "	...	...	...	1,613	458	1,155
19th "	...	...	...	1,735	479	1,256
26th "	...	...	...	1,693	493	1,200

*Comparison of the weekly mortality in the City of Bombay,
etc.—contd.*

Period (week ending)				Mortality during 1896-97.	Mortality during the corresponding period of the five preceding years.	Difference.
1897.						
2nd February	...	...	...	1,624	495	1,129
9th "	...	...	...	1,891	516	1,375
16th "	...	...	...	1,710	544	1,166
23rd "	...	...	...	1,634	518	1,116
2nd March	...	...	...	1,467	522	945
9th "	...	...	...	1,311	520	791
16th "	...	...	...	1,242	506	736
23rd "	...	...	...	1,115	509	606
30th "	...	...	...	1,120	520	600
6th April	...	..	...	997	527	470
13th "	...	...	...	949	544	405
20th "	...	...	...	817	585	232
27th "	...	...	...	642	598	44
4th May	...	...	...	621	577	44
11th "	...	...	...	547	568	-27
18th "	...	...	...	529	574	-44
25th "	...	...	...	516	550	-34
1st June	...	...	...	483	517	-26
8th "	...	...	...	559	515	44
15th "	...	...	...	505	485	20
22nd "	...	...	...	475	440	35
29th "	...	...	...	517	441	76
6th July	...	...	...	522	467	65
13th "	...	...	...	553	463	90
20th "	...	...	...	657	494	163
27th "	...	...	...	732	520	212
3rd August	...	..	...	1,037	548	489
10th "	...	...	...	522	934	412
17th "	...	...	...	518	944	426
24th "	...	...	...	560	830	270
31st "	...	...	...	529	779	250

*Total reported plague seizures in different quarters of the City of No. 4.
Bombay.*

Ward.	Quarter.	Population.	Reported number of seizures.	Number of reported seizures per 1,000 of the population.
Fort	Upper Colaba ...	4,135	104	24
	Middle and Lower Colaba ...	13,622	253	19
	Fort Southern ...	3,951	54	14
	Fort Northern ...	32,847	361	11
	Esplanade ...	10,664	57	6
	TOTAL	64,819	829	13
Mandvi	Mandvi ...	37,295	767	21
	Chakla ...	32,197	144	4
	Umarkhadi ...	52,468	400	8
	Dongri ...	30,317	371	12
	TOTAL	152,277	1,682	11
Bhuleshwar	Market ...	44,751	360	8
	Dhobi Talao ...	39,945	480	12
	Finaswadi ...	24,069	263	11
	Bhuleshwar ...	38,363	239	6
	Khara Talao ...	27,035	234	9
	Khumbharwada ...	32,200	502	16
	TOTAL	206,372	2,078	10
Girgaum	Khetwadi ...	28,814	409	14
	Girgaum ...	26,999	288	11
	Chowpati ...	11,512	122	11
	Valkeshwar ...	12,990	269	21
	Mahalakshmi ...	12,990	411	32
	TOTAL	93,305	1,499	16
Byculla	Mazagon ...	33,640	976	29
	Tarwadi ...	21,298	373	18
	Second Nagpada ...	18,768	195	10
	Kamathipura ...	29,203	735	25
	Tardeo ...	18,980	429	23
	Byculla ...	47,403	989	21
	First Nagpada ...	11,133	264	24
	TOTAL	180,425	3,961	22
Parel	Parel ...	28,740	402	14
	Siwri ...	6,063	185	31
	Sion ...	19,601	387	20
	TOTAL	54,404	974	18
Mahim	Mahim ...	18,505	1,120	61
	Worli ...	25,495	543	21
TOTAL		43,928	1,672	38

No. 10. Reported indigenous plague seizures in the Bombay Presidency in the principal localities where the epidemic prevailed.

Name of place.	4 weeks ending 23rd Oct. 1907.	4 weeks ending 20th November	4 weeks ending 18th December.	4 weeks ending 15th January.	4 weeks ending 12th February.	4 weeks ending 12th March.	4 weeks ending 9th April.	4 weeks ending 7th May.	4 weeks ending 4th June.	4 weeks ending 2nd July.	4 weeks ending 30th July.	4 weeks ending 27th August.	TOTAL.
----------------	-----------------------------------	---------------------------------	----------------------------------	---------------------------------	----------------------------------	-------------------------------	------------------------------	----------------------------	-----------------------------	-----------------------------	------------------------------	--------------------------------	--------

GUJARAT.

AHMEDABAD DISTRICT.

Tankal Dehla ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Ahmedabad City ...	...	2	...	...	...	12	3	3	...	...	...	...	20
Ahmedabad Suburb	...	...	...	...	...	5	2	...	...	...	...	...	7
Other places ...	...	...	...	...	...	...	...	...	...	...	...	...	...
TOTAL	...	2	...	...	...	17	5	3	...	...	...	...	27

SURAT DISTRICT.

Bulsar, Taluka Bulsar	...	...	...	...	2	198	551	148	15	1	...	...	915
Mugod „ „	...	...	...	...	...	...	148	130	1	...	...	...	279
Rander „ Chorasi	...	...	...	...	...	32	72	28	3	2	...	...	137
Kosamba „ Bulsar	...	...	...	...	...	1	4	38	14	6	34	...	97
Surat „ Chorasi	...	...	...	...	...	23	9	25	1	...	1	22	81
Bhadeli Jagalala, Taluka Bulsar	...	...	...	...	...	5	31	22	12	4	9	...	83
Bhagdawada „ „	...	...	...	...	...	2	9	29	14	...	...	...	54
46 other places	...	...	...	...	2	30	153	85	24	1	16	4	315
TOTAL	...	...	...	...	4	291	977	505	84	14	60	26	1,961

CUTCH STATE.

Mandvi, Taluka Mandvi	...	...	...	...	...	2	12	1,824	2,115	124	33	8	4,318
Gundiali „ „	...	...	...	...	...	...	1	2	...	104	34	47	188
Maska „ „	...	...	...	...	...	...	11	2	...	51	37	34	135
Kera „ Bhuj	...	...	...	...	...	...	8	16	14	...	...	15	53
Bada „ Mandvi	...	...	...	...	...	...	...	...	3	19	5	18	45
Merau „ „	...	...	...	...	...	...	...	...	...	14	6	23	43
23 other places	...	...	...	...	1	26	3	22	9	40	14	77	192
TOTAL	...	...	...	...	1	28	35	1,866	2,141	552	129	222	4,974

Reported indigenous plague seizures in the Bombay Presidency, etc.—contd.

Name of place.	23rd October.	20th November.	18th December.	15th January.	12th February.	12th March.	5th April.	7th May.	4th June.	2nd July.	30th July.	27th August.	Total.
Kutiyana	5	29	38	14	2	...	...	88
Bhavnagar	7	21	11	1	...	...	...	40
Five other places	9	1	15	14	...	...	...	39
TOTAL	21	51	64	29	2	...	...	167

KATHIAWAR.

KONKAN.													
THANA DISTRICT.													
Bandra, Taluka Salsette ...	...	...	...	15	111	226	351	140	15	...	...	...	858
Bhiwandi „ Bhiwandi ...	...	...	...	...	28	126	230	97	5	...	...	...	486
Bassein „ Bassein ...	...	...	...	...	...	5	38	141	231	44	1	...	460
Kurla „ Salsette ...	...	...	...	...	10	80	173	101	46	11	...	...	421
Chinchni „ Daharu ...	...	...	...	...	...	25	57	176	69	2	...	...	339
Vesava „ Salsette ...	...	...	...	...	...	...	8	170	24	4	...	...	205
Thana „ „ ...	...	...	...	...	...	7	35	71	30	6	...	...	152
Agashi „ Bassein ...	...	...	...	...	...	3	25	44	63	6	2	...	143
Sopara „ „ ...	...	...	...	...	...	...	4	64	60	3	...	...	131
Tarapur „ Kalyan ...	...	...	...	...	...	...	...	16	93	11	...	...	120
Malgao „ Bassein ...	...	...	...	...	...	5	12	73	15	...	...	...	105
Margaon „ „ ...	...	...	...	...	...	...	...	33	57	4	2	...	96
Shynder „ Salsette ...	...	...	...	...	...	21	45	22	5	...	...	...	93
Mudha „ „ ...	...	...	...	...	...	...	...	52	30	...	...	...	73
Mānori „ „ ...	...	...	...	...	...	...	...	17	28	12	...	...	57
45 other places ...	...	...	...	...	...	10	53	141	179	71	12	...	485
TOTAL ...	...	...	...	15	149	508	1,031	1,341	929	190	29	...	4,314

Reported indigenous plague seizures in the Bombay Presidency, etc.—contd.

Name of place.	23rd October.	20th November.	15th December.	15th January.	12th February.	12th March.	9th April.	7th May.	4th June.	2nd July.	30th July.	27th August.	TOTAL.
KOLABA DISTRICT.													
Rovdanda, Taluka Alibag	101	270	33	12	5	2	423
Alibag „ „	54	167	47	...	...	...	268
Panvel „ Panvel	30	67	50	19	2	...	...	177
Chanjī, Uran Mahal, Taluka Panvel.	2	23	38	15	14	7	99
27 other places	1	...	2	22	39	46	33	35	4	4	17	207
TOTAL	1	...	2	22	68	270	357	172	33	23	26	1,174

RATNAGIRI DISTRICT.

Ladghar, Taluka Dapoli ...	...	...	...	...	...	16	28	2	...	...	...	...	46
Bankot „ „ ...	...	...	...	...	...	...	...	17	...	...	...	...	17
Veshvi „ „ ...	...	...	...	...	...	...	...	1	7	5	...	...	13
Khalgaum near Jaigad ...	...	...	...	...	11	2	...	...	...	...	...	...	13
Karda, Taluka Dapoli ...	...	...	...	...	...	...	8	2	...	...	...	...	10
11 other places ..	...	...	...	...	5	10	3	16	3	...	...	...	37
TOTAL ...	...	...	...	...	16	28	30	38	10	5	...	...	128

DECCAN. •

NASIK DISTRICT.

Igatpuri, Taluka Igatpuri ...	...	...	...	...	...	2	...	2	...	...	...	63	67
Malegaon, „ Malegaon ...	...	...	...	...	...	2	...	...	...	...	...	...	2
TOTAL ...	...	...	...	...	...	4	...	2	...	...	...	63	69

Reported indigenous plague seizures in the Bombay Presidency, etc.—concl'd.

Name of place.	3rd October.	10th November				12th March.	9th April.	7th May.	4th June.	2nd July.	30th July.			
POONA DISTRICT.														
Poona City	14	139	499	1,230	444	67	11	43	71	2,518
Kirkee Cantonment	20	381	401
Lonavla, Taluka Maval	6	3	6	81	129	225
Godnadi „ Sirur	3	...	...	...	2	70	84
Ghorpuri „ Haveli	23	23
8 other places	1	9	6	2	...	...	...	22	40
TOTAL	14	140	508	1,239	452	70	17	146	705	3,291

SATARA DISTRICT.

Karad, Taluka Karad	...	...	...	...	...	...	...	...	...	...	...	138	606	744
Kaledhon „ Khatav	...	...	...	...	...	...	...	...	...	...	...	...	171	171
Sangvi „ Koregaon	...	4	18	7	...	...	9	...	...	...	...	...	...	38
Shere „ Karad	...	...	...	...	...	...	...	...	...	...	...	...	34	34
Waluth „ Javli	...	...	...	...	...	...	23	...	...	...	...	...	...	83
Akhade „ „	...	...	...	...	...	...	15	...	...	...	...	...	...	15
8 other places ...	...	...	...	...	1	4	1	6	...	...	...	...	6	18
TOTAL	...	4	18	7	1	4	48	6	...	...	...	138	817	1,043

• Period (week ending)	Karachi City.	Karachi District.	Hyderabad District.	Shikarpur District.	Upper Sind Frontier District.	Thar and Parkar District.
1896.						
11th December	2	...	...	...	...	...
18th " "	10	3	...	...	...	...
25th " "	26	...	...	...	...	...
1897.						
1st January	35	...	1	1	...	...
8th " "	124	...	3	...	...	...
15th " "	181	14	12	1	...	...
22nd " "	218	11	9	...	...	...
29th " "	230	8	5	...	...	...
5th February	310	22	4	...	...	...
12th " "	284	16	7	4	...	...
19th " "	273	19	6	1	...	...
26th " "	264	19	...	5	...	...
5th March	246	12	4	9	...	...
12th " "	289	11	12	27	...	...
19th " "	251	12	43	32	1	...
26th " "	271	11	45	128	1	...
2nd April	263	18	45	126	...	...
9th " "	199	9	131	120	2	...
16th " "	177	16	122	139	...	...
23rd " "	167	11	78	125	...	...
30th " "	114	10	49	92	...	...
7th May	85	8	40	80	...	...
14th " "	49	5	13	43	...	...
21st " "	40	1	9	14	...	...
28th " "	38	1	1	18	...	...
4th June	27	...	2	22	...	...
11th " "	7	1	...	4	...	...
18th " "	2	...	...	11	...	...
25th " "	4	...	...	4	...	...
2nd July	2	...	...	...	...	...
9th " "	2	...	...	...	...	...
16th " "	4	...	...	...	...	...
23rd " "	5	...	...	...	...	...
30th " "	2	...	...	...	...	...
6th August	...	...	...	...	...	...
13th " "	...	...	...	...	...	...
20th " "	...	...	...	...	...	...
27th " "	...	...	...	...	...	...
TOTAL	4,181	238	641	996	4	3

Reported plague seizures and deaths in Sind.

No. 12.

Period (week ending)	Karachi City.		Karachi District.		Hyderabad District.		Shikarpur District.		Upper Sind Frontier District.		Thar and Parkar District.	
	S.	D.	S.	D.	S.	D.	S.	D.	S.	D.	S.	D.
1896.												
11th December ...	2	1	...	...	...	...	...	...	...	...	...	...
18th " ...	10	10	3	1	...	...	...	...	...	...	...	...
25th " ...	26	26	...	...	...	...	...	...	...	...	...	...
1897.												
1st January ...	35	30	...	...	1	1	1	1	...	...	...	...
8th " ...	124	124	...	...	3	3	...	...	...	...	...	...
15th " ...	181	157	14	8	12	10	1	1	...	...	...	...
22nd " ...	218	206	11	10	9	9	...	...	...	...	...	...
29th " ...	200	181	8	6	5	4	...	...	...	...	...	...
5th February ...	320	277	22	10	4	4	...	...	...	...	...	...
12th " ...	284	269	16	21	7	6	4	1	...	...	...	...
19th " ...	273	235	19	10	6	4	1	2	...	...	1	1
26th " ...	264	205	19	15	...	...	5	2	...	...	...	...
5th March ...	246	200	12	13	4	2	9	10	...	...	...	...
12th " ...	289	200	11	8	12	12	27	17	...	...	...	...
19th " ...	251	200	12	7	43	31	32	23	1	1	...	...
26th " ...	271	185	11	5	45	30	128	100	1	1	2	...
2nd April ...	263	189	18	14	45	36	126	71	...	...	...	1
9th " ...	199	161	9	9	131	68	120	79	2	1	...	...
16th " ...	177	122	16	13	122	103	139	90	...	...	...	...
23rd " ...	167	120	11	8	78	70	125	99	...	...	...	...
30th " ...	114	81	10	6	49	40	92	69	...	...	...	...
7th May ...	85	64	8	8	40	34	80	61	...	...	...	...
14th " ...	40	44	5	3	13	13	43	34	...	...	...	...
21st " ...	40	23	1	1	9	9	14	13	...	...	...	...
28th " ...	38	21	1	1	1	2	18	11	...	...	...	...
4th June ...	27	27	...	...	2	2	12	5	...	...	...	...
11th " ...	7	6	1	1	...	...	4	4	...	...	...	...
18th " ...	2	1	...	...	...	...	11	2	...	...	...	...
25th " ...	4	2	...	...	...	...	4	3	...	...	...	...
2nd July ...	2	2	...	...	...	...	...	1	...	...	...	...
9th " ...	2	2	...	...	...	...	...	...	...	...	...	...
16th " ...	4	2	...	...	...	...	...	...	...	...	...	...
23rd " ...	5	4	...	...	...	...	...	...	...	...	...	...
30th " ...	2	1	...	...	...	...	...	...	...	...	...	...
6th August ...	...	...	...	...	...	...	...	...	...	...	...	...
13th " ...	...	...	...	...	...	...	...	...	...	...	...	...
20th " ...	...	...	...	...	...	...	...	...	...	...	...	...
27th " ...	...	...	...	...	...	...	...	...	...	...	...	...
TOTAL ...	4,181	3,398	238	178	641	499	996	699	4	3	3	2

No. 13. Reported plague seizures in Sind showing separately imported and indigenous cases.

Period, . (Week ending)	KARACHI CITY.		KARACHI DISTRICT.		HYDERABAD DISTRICT.		SHIKARPUR DISTRICT.		UPPER SIND FRONTIER DISTRICT.		THAR AND PARKAR DISTRICT.	
	Imported.	Indigenous.	Imported.	Indigenous.	Imported.	Indigenous.	Imported.	Indigenous.	Imported.	Indigenous.	Imported.	Indigenous.
1896.												
11th December	3	...	...	...	...	...	...	...	...	...
18th "	10	3	...	...	...	...	...	...	...	...
25th "	16	...	...	...	...	...	...	...	...	...
1897.												
1st January	25	...	...	1	...	1	...	...	...	...
8th "	124	...	...	3	...	...	...	...	...	...
15th "	181	13	1	12	...	1	...	...	...	...
22nd "	218	...	...	7	...	...	...	...	...	...
29th "	200	...	...	3	2	...	...	...	...	...
5th February	320	22	...	3	1	...	...	...	...	...
12th "	284	16	...	7	...	3	1	...	...	...
19th "	273	19	...	6	...	1	...	...	...	1
26th "	274	10	...	...	...	...	5	...	...	...
5th March	246	11	3	...	...	3	6	...	...	...
12th "	280	8	3	6	6	10	17	...	...	...
19th "	251	11	1	1	42	4	24	1	...	...
26th "	271	7	4	2	43	31	97	...	...	...
2nd April	263	12	6	12	33	21	105	...	...	...
9th "	199	8	1	13	118	9	112	3	...	...
16th "	177	11	5	2	120	18	181	...	...	...
23rd "	167	2	0	2	76	9	116	...	...	...
30th "	114	3	7	...	49	11	81	...	...	...
7th May	85	...	8	3	37	5	78	...	...	...
14th "	49	2	3	...	13	1	42	...	...	...
21st "	40	1	...	1	8	1	13	...	...	...
28th "	38	1	...	...	1	5	13	...	...	...
4th June	27	...	...	...	2	1	11	...	...	...
11th "	7	...	1	...	...	...	4	...	...	...
18th "	2	...	...	...	...	3	8	...	...	...
25th "	4	...	...	...	...	1	3	...	...	...
2nd July	8	...	...	...	...	...	...	...	...	...
9th "	2	...	...	...	...	...	...	...	...	...
16th "	4	...	...	...	...	...	...	...	...	...
23rd "	5	...	...	...	...	...	...	...	...	...
30th "	2	...	...	...	...	...	...	...	...	...
6th August
13th "
20th "
27th "
TOTAL	...	4,481	185	53	84	557	130	87	3	1	3	...

Reported indigenous plague seizures in Sind in the principal localities where the epidemic prevailed.

No. 14.

KARACHI DISTRICT.

Name of places.	4 weeks ending 15th January.	4 weeks ending 12th February.	4 weeks ending 12th March.	4 weeks ending 9th April.	4 weeks ending 7th May.	4 weeks ending 4th June.	4 weeks ending 2nd July.	4 weeks ending 30th July.	4 weeks ending 27th August.	TOTAL.
Tatta ...	1	...	...	3	13	1	1	...	...	21
Kotri ...	...	...	...	2	13	2	...	...	...	17
Jangshahi ...	...	...	7	3	...	...	...	...	...	10
Other places	...	...	...	4	1	...	...	...	...	5
TOTAL ...	1	...	7	12	29	3	1	...	...	53

HYDERABAD DISTRICT.

Hyderabad ...	...	...	8	232	280	24	...	...	...	544
Tando Alahyar	...	5	2	4	2	...	...	...	...	13
Other places	...	...	...	...	...	...	...	...	...	...
TOTAL ...	...	5	10	236	282	24	...	...	...	557

SHIKARPUR DISTRICT.

Sukkur ...	...	1	24	341	159	12	...	...	...	537
Rohri ...	...	...	1	...	60	43	15	...	...	119
Thati, Taluka Rohri	...	...	...	...	40	7	...	...	...	47
Abad „ Sukkur	...	...	...	...	35	4	...	...	...	39
Khairpur Dahirki, Taluka Ubauro.	...	...	...	...	32	2	...	...	...	34
Miani Bhagat, Taluka Rohri.	...	...	...	...	22	4	...	...	...	26
Tando Mir Muhammad Hasan, Taluka Rohri.	...	...	...	...	14	2	...	...	...	16
Other places...	...	...	3	...	31	5	...	...	...	39
TOTAL ...	...	1	28	341	393	79	15	...	...	857

No. 15. Statement comparing week by week reported seizures with mean temperature and humidity at certain localities where plague was epidemic.

PERIOD.	BOMBAY PRESIDENCY.						SIND.					
	BOMBAY CITY.		POONA CITY.		SURAT DISTRICT.		KARACHI CITY.		HYDERABAD DISTRICT.		SHIKARPUR DISTRICT.	
Daily average for week ending	Reported seizures.	Mean temperature.	Humidity.	Reported seizures.	Mean temperature.	Humidity.	Reported seizures.	Mean temperature.	Humidity.	Reported seizures.	Mean temperature recorded at Hyderabad.	Humidity recorded at Hyderabad.
1896.												
25th September	5	82	86	...	...	...	...	...	...	...	...	...
2nd October	21	84	86	...	...	...	...	...	...	...	...	...
9th "	17	85	83	...	...	...	...	...	...	...	...	...
16th "	8	84	85	...	...	...	...	...	...	...	...	...
23rd "	14	84	82	...	...	...	...	...	...	...	...	...
30th "	10	85	75	...	...	...	...	...	...	...	...	...
6th November	10	83	69	...	...	...	...	...	...	...	...	...
13th "	10	84	74	...	...	...	...	...	...	...	...	...
20th "	12	84	61	...	...	...	...	...	...	...	...	...
27th "	13	77	70	...	...	...	...	...	...	...	...	...
4th December	21	81	77	...	...	...	...	...	...	...	...	...
11th "	43	80	73	...	...	...	...	...	...	...	...	...
18th "	51	70	55	...	...	...	...	...	...	...	...	...
25th "	58	77	64	1	76	49	1	75	54	4	64	40
1897.												
1st January	77	75	68	6	75	66	0	73	69	2	64	53
8th "	70	77	77	3	75	60	1	77	57	18	68	66
15th "	81	75	73	2	72	63	2	73	71	26	62	58
22nd "	67	71	65	2	72	68	3	66	63	31	66	48
29th "	83	74	71	0	76	52	1	73	58	39	66	53
5th February	104	74	73	7	73	57	3	72	66	45	67	61
12th "	116	74	72	6	75	60	2	74	61	41	67	67
19th "	121	76	70	5	70	41	4	76	46	30	66	53
26th "	109	76	73	12	78	52	8	75	62	38	68	70
5th March	97	76	69	21	70	32	17	78	58	15	75	56
12th "	93	76	78	33	79	37	20	78	75	47	73	62
19th "	76	74	78	44	82	31	25	83	64	36	75	78
26th "	61	70	86	49	81	41	30	81	68	39	77	68
2nd April	71	80	77	43	81	43	31	83	63	38	76	76
9th "	64	81	78	40	88	36	43	85	56	28	81	61
16th "	54	83	76	18	83	41	39	81	54	25	82	74
23rd "	38	84	76	17	87	45	17	76	73	24	82	74
30th "	31	85	74	12	90	31	11	91	45	16	84	71
7th May	23	85	73	6	87	40	8	87	67	12	81	78
14th "	16	85	73	3	87	40	4	86	65	7	84	78
21st "	11	86	75	3	87	43	4	83	72	6	86	81
28th "	11	87	77	3	90	46	3	89	60	3	87	77
4th June	9	88	72	3	89	47	3	90	70	4	88	77
11th "	8	85	79	6	85	70	3	91	71	1	93	72
18th "	8	84	84	6	83	73	...	87	76	3	89	81
25th "	4	84	81	...	80	78	1	88	74	6	90	77
2nd July	3	85	77	3	82	68	...	89	65	3	89	77
9th "	1	81	83	1	78	82	...	89	75	3	89	78
16th "	1	80	90	4	76	88	1	84	87	7	87	70
23rd "	3	81	82	3	71	85	7	83	93	3	86	75
30th "	3	82	87	2	76	86	13	83	86	...	...	...
6th August	3	81	90	3	77	90	1	81	88	...	...	...
13th "	4	81	90	3	77	90	1	81	88	...	...	...
20th "	6	82	87	3	78	83	2	82	85	...	...	...

Reported plague seizures outside the Bombay Presidency and Sind. No. 16.

Seizures.

North-Western Provinces and Oudh.

Hardwar between 8th April and 9th June	...	...	18
Delhi, on 1st February	...	...	3
Bareilly, on 5th March	...	...	1
Unao, on 22nd February	...	...	1
Rai Bareilly, on 27th January	...	...	1

Punjab.

Rewari, on 17th January	...	...	1
Rawalpindi District, on 5th April	...	...	2
Sialkot, on 12th February	...	...	1
* Sher Shah, on 7th March	...	...	2

Central Provinces.

Itarsi, between 31st December and 13th February			9
Jubbulpore, on 8th January	...	...	1

Rajputana.

Abu Road, between 24th December and 16th March	...		7
Jodhpur, on 29th January	...	...	1
Nadbai, on 3rd June	...	...	1
Jowalia, on 4th May	...	...	3
Marwar, between 24th December and 12th February	...		7

Central India.

Khandraoni, Gwalior, between 9th January and 27th March			74
Ujjain, between 22nd February and 4th March	...		4
Rutlam, between 12th June and 30th July	...	...	6

Baluchistan.

Sharigh, on 30th March	...	...	1
Sibi, on 12th April	...	...	1

APPENDIX IV.

REGULATIONS UNDER THE EPIDEMIC DISEASES ACT.

PAPER Nos.	CONTENTS.	PAGES.
1.	The Epidemic Diseases Act (III of 1897)	137—138
2—10.	Notifications conferring powers under the Epidemic Diseases Act.	138—141
11—13.	Enactments against plague in Native States—	
	11 Mysore	142
	12 Travancore	143
	13 Cochin	143—144
14—32.	Regulations issued by the Government of Bombay—	
	14—18 Regulations for the City of Bombay	144—152
	19—24 Regulations for the Bombay Presidency in parts other than the City of Bombay	152—169
	25—32 Regulations for the control of railway and other traffic	169—179
33—34.	Regulations issued by the Government of Madras—	
	33 Regulations for the City of Madras	179—183
	34 Regulations for district municipalities and towns and villages	183—189
35—42.	Regulations issued by the Government of Bengal—	
	35 General Regulations issued before the passing of the Epidemic Diseases Act	190—194
	36 Appointment of a Medical Board to direct operations	194
	37 Regulations for the inspection of travellers by railway and steamer	194—196
	38—41 General Regulations for Calcutta and other towns	196—205
	42 Revised General Regulations of November, 1897	206—221
43.	Rules for the jurisdiction of the Military authorities at Calcutta	222—223

REGULATIONS UNDER THE EPIDEMIC DISEASES ACT—*contd.*

PAPER Nos.	CONTENTS.	PAGES.
44—49.	Regulations issued by the Government of the North-Western Provinces and Oudh—	
44—45	General Regulations	223—245
46—47	Revised General Regulations of March, 1897	245—259
48—49	Merchandise and rags	259—260
50—65.	Regulations issued by the Government of the Punjab—	
50—60	Regulations for the control of traffic	260—269
61—65	General Regulations and executive instructions	269—280

APPENDIX IV.

REGULATIONS UNDER THE EPIDEMIC DISEASES ACT.

No. 1. Epidemic Diseases Act (III of 1897).

*(Received the assent of the Governor General on the 4th
February 1897.)*

An Act to provide for the better prevention of the spread of
Dangerous Epidemic Disease.

Whereas it is expedient to provide for the better prevention of
the spread of dangerous epidemic disease; it is hereby enacted as
follows :—

1. (1) This Act may be called the Epidemic Diseases Act, 1897. Short title,
extent and
commencement.
- (2) It extends to the whole of British India (inclusive of Upper
Burma, British Baluchistan, the Santal Parganas and the Pargana of
Spiti); and
- (3) It shall come into force at once.
2. (1) When at any time the Governor General in Council is
satisfied that India or any part thereof is visited by, or threatened
with, an outbreak of any dangerous epidemic disease, the Governor
General in Council, if he thinks that the ordinary provisions of the
law for the time being in force are insufficient for the purpose, may
take or require or empower any person to take such measures and
by public notice, prescribe such temporary regulations to be observed
by the public or by any person or class of persons as he shall deem
necessary to prevent the outbreak of such disease or the spread
thereof, and may determine in what manner and by whom any
expenses incurred (including compensation, if any) shall be defrayed.
Power to take
special
measures and
prescribe
regulations
as to dangerous
epidemic
disease.
- (2) In particular and without prejudice to the generality of the
foregoing provisions, the Governor General in Council may take
measures and prescribe regulations for—
 - (a) the inspection of any ship or vessel leaving, or arriving at,
any port in British India and such detention thereof, or of
any person intending to sail therein or arriving thereby, as
may be necessary; and

- (b) the inspection of persons travelling by railway or otherwise and the segregation, in hospital, temporary accommodation or otherwise, of persons suspected by the inspecting officer of being infected with any such disease.

(3) The Governor General in Council may, by general or special order, direct that all or any of the powers conferred by this Act may also be exercised by any Local Government with respect to the territories administered by it.

Penalty.

3. Any person disobeying any regulation or order made under this Act shall be deemed to have committed an offence punishable under section 188 of the Indian Penal Code.

Protection to persons acting under Act.

4. No suit or other legal proceeding shall lie against any person for anything done or in good faith intended to be done under this Act.

Notifications conferring Powers under the Epidemic Diseases Act.

Home Department General Notification conferring powers No. 2. on Local Governments.

No. 302, dated the 4th February 1897.

Whereas certain parts of India are visited by, and others threatened with, an outbreak of dangerous epidemic disease known as bubonic plague, the Governor General in Council, in exercise of the powers conferred by section 2, sub-section (3) of the Epidemic Diseases Act, 1897, is pleased to direct that the powers conferred by the said Act may be exercised by Local Governments with regard to their respective territories as follows :—

- (a) all the said powers by the Governors of Fort St. George and Bombay in Council, the Lieutenant-Governor of Bengal and Chief Commissioner of Burma ;
- (b) the powers conferred by section 2, sub-section (1), and sub-section (2), clause (b), by the Lieutenant-Governor of the North-Western Provinces and Chief Commissioner of Oudh, the Lieutenant-Governor of the Punjab and the Chief Commissioner of the Central Provinces ; and
- (c) the powers conferred by section (2), sub-section 2, clause (b) by the Chief Commissioners of Assam, Coorg, and British Baluchistan,

No. 3. *Home Department Notifications conferring powers in Ajmere-Merwara under the travellers' inspection clause, and*
• *the general sub-section.*

No. 510, dated the 16th February 1897.

Whereas certain parts of India visited by, and others threatened with, an outbreak of dangerous epidemic disease known as bubonic plague, the Governor General in Council, in exercise of the powers, conferred by section 2, sub-section (3) of the Epidemic Diseases Act, 1897, is pleased to direct that the powers conferred by section 2, sub-section (2), clause (b) of the said Act may be exercised with regard to Ajmere-Merwara by the Chief Commissioner of Ajmere-Merwara.

No. 4. No. 834, dated the 6th March 1897.

Whereas certain parts of India are visited by, and others threatened with, an outbreak of dangerous epidemic disease known as bubonic plague, the Governor General in Council, in exercise of the powers conferred by section 2, sub-section (3) of the Epidemic Diseases Act, 1897, is pleased to direct that the powers conferred by section 2, sub-section (1) of the said Act may be exercised with regard to Ajmere-Merwara by the Chief Commissioner of Ajmere-Merwara.

No. 5. *Foreign Department Notification extending the Epidemic Diseases Act to territories which are under the administration of the Governor General in Council, but are not in British India.*

No. 443-I.A., dated the 4th February 1897.

Whereas certain parts of India are visited by, and others threatened with, an outbreak of dangerous epidemic disease known as bubonic plague, the Governor General in Council is pleased to apply the Epidemic Diseases Act, 1897, to all territories in India which are under the administration of the Governor General in Council, but are not part of British India, including the territories for the time being administered by the Agent to the Governor General in Baluchistan as such Agent, and including also all lands which are or may hereafter be, occupied by railways, and in which the Governor General in Council has or exercises jurisdiction.

2. For the purposes of the said enactment so applied the expression "Local Government" shall be construed to mean the person

who for the time being administers executive government in the territories concerned.

Foreign Department Notification conferring powers under No. 6. the travellers' inspection clause in the territories mentioned in the preceding Notification.

No. 444-I.A., dated the 4th February 1897.

Whereas certain parts of India are visited by, and others threatened with, an outbreak of dangerous epidemic disease known as bubonic plague, the Governor General in Council, in exercise of the powers conferred by section 2, sub-section (3) of the Epidemic Diseases Act, 1897, as applied by the Notification of the Government of India in the Foreign Department, No. 443-I.A., dated the 4th February, 1897, to all territories in India which are under the administration of the Governor General in Council, but are not part of British India, including all railway lands and the territories for the time being administered by the Agent to the Governor General in Baluchistan as such Agent, is pleased to direct that the powers conferred by section 2, sub-section (2), clause (b) of the said Act as so applied, may be exercised by the Local Government in each case.

Foreign Department Notification conferring powers under No. 7. the general sub-section in the Civil and Military Station of Bangalore.

No 567-I.A., dated the 12th February 1897.

Whereas the Epidemic Diseases Act (III of 1897) has been applied to, amongst other places, the Civil and Military Station of Bangalore by the Notification of the Government of India in the Foreign Department, No. 443-I.A., dated the 4th February 1897.

In exercise of the powers conferred by section 2, sub-section (3), of the said Act as so applied, the Governor General in Council is pleased to direct that all the powers conferred by section 2, sub-section (1), thereof may be exercised by the Local Government.

Foreign Department Notification conferring powers on the No. 8. Agent to the Governor General in Baluchistan under the general sub-section.

No. 809-I.A., dated the 1st March 1897.

Whereas the Epidemic Diseases Act (III of 1897) has been applied to, amongst other places, the territories for the time being admin-

istered by the Agent to the Governor General in Baluchistan as such Agent, by the Notification of the Government of India in the Foreign Department, No. 443-I.A., dated the 4th February 1897.

In exercise of the powers conferred by section 2, sub-section (3), of the said Act as so applied, the Governor General in Council is pleased to direct that all the powers conferred by section 2, sub-section (1), thereof may be exercised by the Local Government.

No. 9. *Foreign Department Notification conferring powers under the general sub-section in the Hyderabad Residency Bazaars, the Cantonment of Secunderabad, the Stations of the Hyderabad Contingent, and the Hyderabad Assigned Districts.*

No. 1232-I.A., dated the 3rd April 1897.

Whereas the Epidemic Diseases Act (III of 1897) has been applied to, amongst other places, the Hyderabad Residency Bazaars, the Cantonment of Secunderabad, the Stations of the Hyderabad Contingent, and the Hyderabad Assigned Districts, by the notification of the Government of India in the Foreign Department, No. 443-I.A., dated the 4th February 1897.

In exercise of the powers conferred by section 2, sub-section (3), of the said Act as so applied, the Governor General in Council is pleased to direct that all the powers conferred by section 2, sub-section (1), thereof may be exercised by the Local Government.

No. 10. *Foreign Department Notification conferring powers under the general sub-section in the Cantonments of Mhow, Neemuch, and Nowgong.*

No. 1421-I.A., dated the 15th April, 1897.

Whereas the Epidemic Diseases Act (III of 1897) has been applied to, amongst other places, the Cantonments of Mhow, Neemuch, and Nowgong, by the Notification of the Government of India in the Foreign Department, No. 443-I.A., dated the 4th February 1897.

In exercise of the powers conferred by section 2, sub-section (3), of the said Act as so applied, the Governor General in Council is pleased to direct that all the powers conferred by section 2, sub-section (1), thereof may be exercised by the Local Government.

Enactments against Plague in Native States.

MYSORE.

• No. II.

Regulation No. 11 of 1897.

(Passed on the 11th day of February 1897.)

A Regulation to provide for the prevention of the outbreak or spread of dangerous epidemic disease.

Preamble.

Whereas it is expedient to provide for the prevention of the outbreak or spread of dangerous epidemic disease in Mysore, Her Highness the Maharani Regent is pleased to enact as follows:—

Title.

1. (i) This Regulation may be called "The Epidemic Diseases Regulation, 1897."

Extent.

(ii) It extends to the whole of the Territories of Mysore; and

Commencement.

(iii) It shall come into force at once.

2. (i) When at any time the Government of Mysore is satisfied that Mysore or any part thereof is visited by, or threatened with, an outbreak of any dangerous epidemic disease, the said Government, if it thinks that the ordinary provisions of the law for the time being in force are insufficient for the purpose, may take such measures and, by public notice, prescribe such temporary regulations to be observed by the public or by any person or class of persons, as it shall deem necessary to prevent the outbreak of such disease or the spread thereof, and may determine in what manner and by whom any expenses incurred (including compensation, if any) shall be defrayed.

(ii) The Government of Mysore may require or empower any person to take such measures as he shall deem necessary to prevent the outbreak of such disease or the spread thereof.

(iii) In particular, and without prejudice to the generality of the foregoing provisions, the Government of Mysore may take measures and prescribe regulations for the inspection of persons travelling by railway or otherwise, and the segregation, in hospital, temporary accommodation or otherwise, of persons suspected by the inspecting officer of being infected with any such disease.

3. Any person disobeying any regulation or order made under this Regulation shall be deemed to have committed an offence punishable under section 188 of the Indian Penal Code.

4. No suit or other legal proceeding shall lie against any person for anything done, or in good faith intended to be done, under this Regulation.

No. 12.

TRAVANCORE.

Regulation I of 1072.

A regulation to provide for the better prevention of the outbreak or spread of dangerous epidemic disease passed by His Highness the Maharaja of Travancore on the 24th February, 1897, corresponding with the 14th Kumbhum 1072, under section 10 of Regulation II of 1063.

Whereas it is expedient to provide for the better prevention of the outbreak and spread of dangerous epidemic disease; It is hereby enacted as follows:—

1. This Regulation may be called the Epidemic Diseases Regulation of 1072 and shall come into force at once. Short title.
2. Our Government may, on being satisfied that any part of Travancore is visited by, or threatened with, an outbreak of any dangerous epidemic disease, or that there is risk of any such disease being imported into any part of Travancore, take such measures and, by public notice, prescribe such temporary rules to be observed by the public or by any person or class of persons, as may be deemed necessary to prevent the outbreak or the spread of such disease or the importation thereof, and may determine in what manner and by whom any expenses incurred (including compensation if any) shall be defrayed. Power to take special measures and prescribe rules.
3. Any person disobeying any rule or order made under this Regulation shall be deemed to have committed an offence punishable under section 188 of the Penal Code. Penalty.
4. No suit or other legal proceeding shall lie against any person for anything done or in good faith intended to be done under this Regulation. Protection to persons acting under Regulation.

No. 13.

COCHIN.

Regulation I of 1072.

(Passed by His Highness the Raja of Cochin on the 24th day of Kumbhum 1072, corresponding with the 6th day of March 1897.)

A Regulation to provide for the better prevention of the spread of Dangerous Epidemic Disease.

Whereas it is expedient to provide for the better prevention of the spread of dangerous epidemic disease; It is hereby enacted as follows:—

1. (1) This Regulation may be called the Epidemic Disease Regulation, I of 1072. Short title, extent and commencement.

(2) It extends to the whole of Cochin State.

(3) It shall come into force at once.

Power to take special measures and prescribe Regulations as to dangerous epidemic disease.

2. (1) When at any time the Dewan is satisfied that the Cochin State or any part thereof is visited by, or threatened with, an outbreak of any dangerous epidemic disease, the Dewan, if he thinks that the ordinary provisions of the law for the time being in force are insufficient for the purpose, may take or require or empower any person to take such measures and, by public notice, prescribe such temporary regulations to be observed by the public or by any person or class of persons as he shall deem necessary to prevent the outbreak of such disease or the spread thereof, and may determine in what manner and by whom any expenses incurred (including compensation if any) shall be defrayed.

(2) In particular and without prejudice to the generality of the foregoing provisions, the Dewan may take measures and prescribe regulations for—

(a) the inspection of any ship or vessel leaving, or arriving at, any port in Cochin and such detention thereof, or of any person intending to sail therein, or arriving thereby, as may be necessary ; and

(b) the inspection of persons travelling by railway or otherwise and the segregation, in hospital, temporary accommodation or otherwise, of persons suspected by the inspecting officer of being infected with any such disease.

Penalty.

3. Any person disobeying any rule or order made under this Regulation shall be deemed to have committed an offence punishable under section 174 of the Cochin Penal Code (Regulation I of 1059).

Protection to persons acting under Regulation.

4. No suit or other legal proceeding shall lie against any person for anything done or in good faith intended to be done under this Regulation.

Regulations issued by the Government of Bombay.

REGULATIONS FOR THE CITY OF BOMBAY.

General Regulations.

No. 14.

Notification No. 228-P., dated the 10th February 1897.

Preamble.

Whereas the City of Bombay is visited by an attack of a dangerous epidemic disease, namely, bubonic plague, and whereas the Governor of Bombay in Council is of opinion that the ordinary provisions of the law for the time being in force are insufficient for

the purpose of preventing the spread thereof; pursuant to the provisions of section 2, sub-section 1, of the Epidemic Diseases Act, 1897, and in exercise of the powers in this behalf conferred by the Governor-General in Council under section 2, sub-section 3, of the same Act, the Governor of Bombay in Council is pleased to empower the Municipal Commissioner for the City of Bombay to take the measures hereinafter specified to prevent the spread of bubonic plague, and is further pleased to prescribe the temporary regulations hereinafter set forth to be observed by the public and all persons concerned:—

I.—If for any reason it shall appear to the Commissioner that any building intended for or used as a dwelling is unfit for human habitation, he may, of his own motion, prohibit by a written order the further use of such building as a dwelling, and cause notice of such prohibition to be affixed to the door of, or on some conspicuous part of, such building. Abatement of overcrowding.

As a temporary regulation, it is hereby prescribed that when any such prohibition has been made, no owner or occupier of such building shall use or suffer the same to be used for human habitation until the Commissioner certifies in writing that the causes rendering it unfit for human habitation have been removed to his satisfaction.

For the purpose of enforcing and carrying into effect the said regulation, the Commissioner or any Police or other officer acting in co-operation with or under the orders of the Commissioner may, if necessary, forcibly remove any person from such building and may prevent the re-occupation thereof until such time as the Commissioner shall have certified as aforesaid.

II.—If it shall appear to the Commissioner that any building used as a dwelling is so overcrowded as to endanger the health of the inmates thereof, he may, of his own motion, by written order require the owner of the building, within a time not exceeding seven days to be prescribed in the said order, to abate the overcrowding thereof by reducing the number of lodgers, tenants or other inmates of the said building. As a temporary regulation it is hereby prescribed that the provisions of sub-sections (2) and (3) of section 379 of the City of Bombay Municipal Act, 1888, shall (*mutatis mutandis*) apply in the case of any such requisition by the Commissioner in the same manner and to the same extent in all respects as if such requisition had been made by the Chief Presidency Magistrate under the provisions of sub-section (1) of the same section. Insanitary buildings.

For the purpose of enforcing and carrying into effect the said regulation, the Commissioner or any Police or other officer as aforesaid may, if necessary, at the expiration of the time prescribed in the

Commissioner's order, require such and so many of the inmates of the building as the Commissioner may direct, to forthwith vacate the said premises, and such inmates as are so required shall forthwith vacate accordingly, or, if they fail to do so, the Commissioner or any Police or other officer as aforesaid may forcibly remove them and prevent their re-occupation of such building.

Vacation of buildings for cleansing, disinfecting or other purposes.

III.—If the Commissioner shall be of opinion that it is necessary that any building or premises be vacated for the purpose of cleansing or disinfecting or otherwise for the purpose of checking the spread of disease, he may, by the written notice mentioned in Section 425 of the Municipal Act aforesaid, require the owner or occupier of such building to vacate the same within such time as shall be prescribed in the said notice.

As a temporary regulation it is hereby prescribed that when any such requisition has been made, every inmate or occupier of the building shall, within the time so prescribed, vacate such building and remove his property and effects and any animals therefrom.

For the purpose of enforcing and carrying into effect the said regulation, the Commissioner or any Police or other officer as aforesaid may, if necessary, after the expiration of such time forcibly remove any person and any property or animal or thing from such building, and may prevent the re-occupation of such building or any part thereof for so long as the Commissioner may deem necessary.

Opening, cleansing and disinfecting of deserted buildings and treatment of property found in them.

IV.—If and whenever any building or part of a building which has been vacated or deserted by the inmates thereof is found to be fastened or locked up, the Commissioner may, by a written notice affixed on the door, require that such building or part of a building be opened and that all property (if any) therein be removed therefrom within such time, not being less than 24 hours, as may be prescribed in such notice, and at the expiration of the time so prescribed the Commissioner or any Police or other officer as aforesaid may forcibly break open and enter any such building or part of a building and cleanse, disinfect and ventilate the same and remove and disinfect or destroy any grain, bedding or clothing or any other goods or articles found therein and may forcibly prevent the re-occupation of such building or part of a building for so long as the Commissioner may deem necessary.

Commissioner may cleanse and disinfect buildings and destroy property.

V.—For the purpose of preventing the spread of disease, and for carrying into effect any of the measures contemplated by section 425 of the Municipal Act aforesaid, the Commissioner may, without any such previous notice of requisition to the owner or occupier of a building as in the said last mentioned section provided, himself cause such building or any part thereof to be cleansed or disinfected

and any article found therein to be removed, disinfected or destroyed.

VI.—The operation of cleansing or disinfecting a building within the meaning of this Notification shall be deemed to include not only the cleansing and limewashing of such building, but also, if deemed necessary, the removal of the earth or soil of the ground floor thereof to a depth of four inches, the removal of the whole or any part of the roof thereof, the removal of floors, the burning of kerosine oil or any other substance thereon, or any other measure whatever.

Meaning of
cleansing and
disinfecting.

The expense of carrying into effect any of the measures hereby authorized for cleansing or disinfecting a building shall, in the first instance, be defrayed by the Commissioner out of the Municipal Fund, but shall, at his discretion, be recoverable from the owner or occupier of such building under the ordinary provisions of the Municipal Act aforesaid, in the same manner, in all respects, as if the work had been done after notice and after failure to comply with notice within the meaning of section 489 of the same Act.

Incidence of
expenditure.

VII.—Save such compensation, if any, as the Commissioner may, in his discretion, allow under sub-section (4) of section 427 of the Municipal Act aforesaid, no person shall be entitled to recover any compensation by way of damages or otherwise for the destruction or disinfection of any article removed or dealt with as hereinbefore provided.

Compensation.

The owner of any moveable property in any building dealt with under the powers hereby conferred shall be responsible for taking charge of such property at the time when any action is taken under such powers, or, in the case of an article requiring disinfection, so soon as the same has been disinfected, and in default of his so doing the officer in charge of the operations may cause such property to be placed wherever he may think fit, and neither the owner nor any person interested therein shall have any claim for compensation, damages or otherwise in respect of loss of or damage to such property, however caused, during the removal thereof or at any time thereafter.

Charge of
property.

VIII.—If the Commissioner shall be of opinion that any water-connection inside any building is, or is likely to be, detrimental to the health of persons residing therein or in the neighbourhood thereof, he may, after causing a stand-pipe or other sufficient means for the supply of water to be provided outside such building cause the water-connection with the interior of such building to be cut off.

Cutting off of
water-connection.

IX.—If in the opinion of the Commissioner any building (not being a hut or shed) which has been vacated, or which has been dealt with, under any of the provisions of this Notification, cannot

Demolition of
buildings.

be adapted to the sanitary requirements of a dwelling, or is otherwise permanently unfit for human habitation, or if its existence is a source of danger, the Commissioner may demolish the same or any part thereof.

Valuation.

Prior to any such building being demolished, the Commissioner shall cause the same, or such part thereof as he may think necessary to demolish, to be surveyed, and its value at the time to be assessed by such person as Government may, by name or by virtue of office, appoint for that purpose, and shall by written notice affixed on some conspicuous part of such building intimate the date (not being less than seven days from the date of such notice) and the hour at which the building will be surveyed and assessed as aforesaid, and the work of demolition shall not be commenced until the building or portion thereof has been surveyed and the value so assessed. The valuation of such building by such officer shall be final and conclusive and the owner shall be entitled to receive the amount thereof which shall be provided out of the Municipal fund, but he shall not be entitled to receive any further or other sum by way of compensation.

Effect on ownership of land.

Subject to the powers of the Municipal Commissioner under sections 297, 298, and 299 of the Municipal Act aforesaid to acquire any portion of the site for the widening or improvement of any street any such demolition as aforesaid shall not affect the ownership of the land, nor shall it confer on any Fazindar or other superior owner any right which he would not have had, if such demolition had not taken place, in regard to resuming possession or otherwise.

Building materials.

The materials of any building or part of a building demolished as aforesaid shall be the property of the Municipality and shall be removed and disposed of, or, if necessary, destroyed by the Commissioner.

Rule of assessment.

In assessing the value of any building regard shall be had only to the then actual market value of the structure, and no allowance shall be made, nor shall any compensation be paid, for compulsory demolition or otherwise.

* Notification
No. 4691—3120
P., dated 30th
August 1897.

*IX-A.—In the event of the assessors being unable to complete the surveys and valuations of the houses at the hour and on the date for which notices have been issued, they shall have power to arrange with the owners of the buildings concerned to complete them on some subsequent date or dates convenient to both parties, without further reference to the Municipal Commissioner.

Saving clause.

X.—The provisions of this Notification are not intended to, and shall not, operate to limit in any way any powers which the Commissioner may possess independently of the powers hereby conferred.

No. 15.

• *Inspection of persons entering Bombay.*

Resolution No. 1108—595-P., dated the 2nd March 1897.

• Letter from the Municipal Commissioner for the City of Bombay, No. 24588, dated the 18th February 1897—

Represents the necessity for preventing the ingress of persons suffering from, or infected with bubonic plague into the limits of Bombay as far as possible and for checking the ingress of emaciated or sickly persons from the Deccan districts into the urban area.

Letter from the Municipal Commissioner for the City of Bombay, No. 25123, dated the 23rd February 1897.

Forwards, for such action as may be deemed fit, copy of the following letter No. 42078, dated 16th February 1897, from the Health Officer, Bombay Municipality :—

“With reference to Government Resolution in the General Department, No. 592, dated the 3rd idem, relative to the imposition of quarantine at Karachi against arrivals from Bombay, I have the honour to suggest that Government be addressed on the subject of having a rigorous examination of all passengers coming to Bombay from Karachi and Coast ports, north and south. I understand that a large number of persons have returned to Bombay from Veraval on account of the scarcity there, and as time goes on there must be many returning from the surrounding districts driven out by scarcity or poverty.”

Letter from the Municipal Commissioner for the City of Bombay, No. 25542, dated the 27th February 1897—

Forwards copy of the following letter No. 43097, dated 25th February 1897, from the Health Officer, Bombay Municipality; and requests that the question may be disposed of as soon as practicable :—

“In continuation of this office letter No. 41507 of 10th instant, I have the honour to earnestly urge the immediate extension of the system of medical examination to all persons coming to Bombay. I hear that a large number of people are coming in from Gujarāt.”

Letter from Surgeon-Major A. W. F. Street, D.S.O., I.M.S., on special duty, No. 16, dated the 27th February 1897—

Suggests that steps should be taken to prevent persons suffering from plague being brought into Bombay.

Inspection of
persons entering
Bombay by rail,
sea or road.

RESOLUTION.—The Governor in Council will be prepared to sanction, if necessary, a rule under Act III of 1897, prescribing, as a temporary regulation, that nobody shall be allowed to enter Bombay, by rail, sea or road, without submitting to medical inspection and, if necessary, detention under observation if suspected to be suffering from plague, or removal to a hospital if found to be suffering from that disease. This rule cannot be made, however, until an adequate inspecting staff has been provided. The Municipal Commissioner should, without delay, make arrangements for such a staff, the cost of which—the Governor in Council is pleased to direct under section 2 (1) of the Act—shall be borne by the Bombay Municipality.

Constitution of a Plague Committee for the City of Bombay.

Notification No. 1204—702-P., dated the 5th March 1897.

In exercise of the powers conferred by sub-section (1) of section 2 of the Epidemic Diseases Act, 1897, and of the powers in this behalf conferred by the Governor General in Council under section 2, sub-section (3), of the same Act, the Governor of Bombay in Council is pleased to direct as follows:—

Constitution of
Committee.

1. The following gentlemen are constituted a Committee for the purpose of carrying out, under the orders of Government, the measures to be taken to suppress, and prevent the spread of, bubonic plague in the City of Bombay:—

(1) Brigadier-General W. F. Gatacre, } *Chairman.*
C.B., D.S.O.

(2) Mr. P. C. H. Snow, I.C.S., Barrister-
at-Law, Municipal Commissioner,
Bombay Municipality.

(3) Surgeon-Major H. P. Dimmock, } *Members.*
M.R.C.S., L.R.C.P.

(4) Mr. C. C. James, A.M.I.C.E. ... }

Powers vested
in Committee.

2. The Committee are invested with all the powers conferred on or vested in the Municipal Commissioner for the City of Bombay by sections 422, 423, 424, 425, 426, 427 and 429 of the City of Bombay Municipal Act, 1888, and by the Notification of the Municipal Commissioner, dated the 6th October 1896, and by the Notification No. 228-P. of the Governor of Bombay in Council, dated the 10th February 1897, and the Committee are empowered to take any of the measures authorized by the said sections and Notifications.

3. The Municipal Corporation of the City of Bombay, and all the officers and servants of the Corporation, and all public servants and all persons employed by the Committee shall carry into effect, without delay, any measures which may be ordered by the Committee. Municipal Corporation to carry into effect measures ordered by Committee.
4. All expenses incurred in carrying out such measures shall, in the first instance, be paid out of the municipal Fund of the City of Bombay, but the Municipal Commissioner or the Corporation may recover from any person any amount which such person would, under similar circumstances, be liable to pay to the Municipal Commissioner or the Corporation under the City of Bombay Municipal Act, 1883. Incidence of expenditure.
5. On the requisition of the Committee, the Commissioner of Police shall give such assistance as may be necessary in order to enforce immediate compliance with any order of the Committee. Commissioner of Police to assist.
6. If the Committee have reason to believe that any building is or has recently been occupied by a sufferer from the plague or that any death which has not been certified by a Medical Officer holding Her Majesty's Commission, or some other Medical Officer empowered by the Committee to certify in this behalf, to be due to some other cause than plague, has occurred in any building, the Committee may cause the inmates of such building to be segregated in such place as they may appoint for that purpose for a period not exceeding ten days. Notification No. 1638-A.—1107-A. P., dated the 23rd March 1897. Segregation of inmates of infected buildings.

No. 17. *Closure of the Grant Road Mahomedan Burial-ground.*

Notification No. 2112—1575-P., dated the 21st April 1897.

Whereas the City of Bombay is visited by an attack of dangerous epidemic disease, namely, bubonic plague; and whereas the Governor of Bombay in Council is of opinion that the ordinary provisions of the law for the time being in force are insufficient for the purpose of preventing the spread thereof: pursuant to the provisions of section 2, sub-section 1, of the Epidemic Diseases Act, 1897, and in exercise of the powers in this behalf conferred by the Governor General in Council under section 2, sub-section 3, of the same Act, the Governor of Bombay in Council is pleased to direct that the Mahomedan burial ground situate at Grant Road within the City of Bombay (con-

taining by admeasurement 17,870 square yards or thereabouts and bounded as follows: on the north partly by land, the property of Government, and partly by the Kamatipura Municipal Milch Cattle Stable, on the south by the Grant Road, on the east by Trimbuck Parashram Street, and on the west by Cursetji Suklaji Street) shall on and after the 30th day of April 1897 be no longer used for the disposal of the dead until further notice.

Closure of certain causeways at night.

No. 18.

Notification No. 3250—2402-P., dated the 12th June 1897.

The following Resolution of Government is published:—

“RESOLUTION.—In furtherance of the arrangements for the inspection during the monsoon of persons entering or leaving Bombay, it is found necessary to continue the closure of the two causeways between Bandra and Mahim and Kurla and Sion, respectively, and the inspection and, if necessary, detention of persons crossing those causeways. The following regulation is therefore issued under Act III of 1897:

The Bombay Plague Committee and such plague authorities as they may appoint have been empowered to close the Mahim-Bandra and Sion-Kurla Causeways between the hours of 8 P.M. and 5 A.M., and further to examine all persons crossing the causeways between the hours of 5 A. M. and 8 P.M., and, if necessary, to detain and send to hospitals or other places appointed for the purpose persons found or believed to be suffering from the plague.

“2. This Resolution should be notified in the *Bombay Government Gazette*.”

**REGULATIONS FOR THE BOMBAY PRESIDENCY IN PARTS
OTHER THAN THE CITY OF BOMBAY.**

General Regulations.

No. 19.

Notification No. 1278—1201-P., dated the 29th March 1897.

The following new edition of general rules under Act III of 1897 is issued in supersession of those in the following Notifications:—

No. 941—398-P., dated 20th February 1897.

No. 974—452-P., dated 23rd February 1897.

No. 1001—472-P., dated 24th February 1897.

No. 1071—541-P., dated 27th February 1897.

No. 1102—586-P., dated 1st March 1897.

No. 1103—587-P., dated 1st March 1897.

No. 1114—601-P., dated 2nd March 1897.

No. 1136—632-P., dated 3rd March 1897.

No. 1195—686-P., dated 5th March 1897.

No. 1212—795-P., dated 10th March 1897.

No. 1332—822 P., dated 10th March 1897.

No. 1485—942-P., dated 16th March 1897.

No. 1520—974-P., dated 17th March 1897.

No. 1521—977-P., dated 17th March 1897.

No. 1558—1014-P., dated 19th March 1897.

No. 1647—1109-P., dated 24th March 1897.

Whereas certain parts of the Presidency of Bombay are visited by, or threatened with an outbreak of, a dangerous epidemic disease, namely, bubonic plague, and whereas the Governor of Bombay in Council is of opinion that the ordinary provisions of the law for the time being in force are insufficient for the purpose of preventing the spread thereof in parts other than the City of Bombay; pursuant to the provisions of section 2, sub-sections (1) and (2), of the Epidemic Diseases Act, 1897, and in exercise of the powers in this behalf conferred by the Governor-General in Council under section 2, sub-section (3), of the same Act, the Governor of Bombay in Council is pleased to empower the officers herein below mentioned to take the measures hereinafter specified to prevent the spread of bubonic plague, and is further pleased to prescribe the temporary regulations hereinafter set forth to be observed by the public and all persons concerned.

1. In every local area where there is danger of plague, the District Magistrate, subject to the general instructions of the Commissioner, may appoint special officers, either by name or by virtue of office, to devise and carry out, under the District Magistrate's general directions, all measures necessary to prevent the spread of the plague. Appointment of Plague authorities.

2. The special officers appointed for any local area under these rules may be known as Plague authorities.

3. At any Railway Station or Bandar, to which no medical officer has been or may be specially appointed for inspection duty under rules sanctioned by Government concerning the inspection of travellers by rail or boat, any Plague authority who may be present on duty or other officer or person specially authorised in this behalf by the District Magistrate, if he reasonably believes or suspects that any person alighting or disembarking from a train or boat is suffering from bubonic plague, may detain any such person for the purpose of Detention and inspection of travellers at Railway Stations and Bandars to which no medical officer has been specially appointed.

medical examination, and shall (if he be not himself a medical officer authorised under these rules) without delay give information of the detention to the nearest medical officer so authorised. Any Station Master at a railway station where no medical officer has been posted on inspection duty may forward to the nearest station at which such a medical officer is posted any person who is or is suspected by him to be suffering from the plague. Persons entering a train or embarking on a boat shall similarly be liable to inspection and detention under this rule by the persons and under the circumstances above mentioned.

Inspection and detention of persons leaving an infected area.

4. A Plague authority or any person authorised by a District Magistrate in this behalf may inspect or cause the inspection of persons leaving an infected area, and may, if any such person is suffering or is suspected by him to be suffering from plague, detain or cause the detention of such person at a place appointed for the purpose or may forward him or cause him to be forwarded to such place.

Inspection and detention on roads leading to towns and villages.

5. At any place specially appointed by the District Magistrate or by any officer empowered by him in this behalf, and situate on a road leading into a town or village, any Plague authority on duty or other officer or person specially authorised in this behalf by the District Magistrate may detain, for the purpose of medical examination, any person whom he reasonably believes or suspects to be suffering from the plague, and shall (if he be not himself a medical officer authorised under these rules) give information of the detention to the nearest medical officer so authorised. Authority is given to District Magistrates to place inspecting officers at posts or roads leading from an infected town or village or other place in order to prevent the removal of the sick into healthy towns or villages.

Report of plague cases in any town, village, or other area, and investigation by a medical officer.
*Notification No. 1968-1421-P., dated the 10th April 1897.

6. In any town or village or other area to which this rule shall be applied by the District Magistrate, an occupant of a house or building or the principal surviving member of a family shall give immediate information to the nearest Plague authority of* (a) any sickness due or likely to be due to plague, (b) any death, whatever may be the cause of it. Such Plague authority (if he be not himself a medical officer) shall without delay send word to the nearest medical officer holding Her Majesty's Commission or in charge of a Government or State-aided medical institution, or to a medical officer employed by a Municipality not lower in grade than a Hospital Assistant, or to any such medical officer on pension, and such medical officer whether appointed a Plague authority for the locality or not, shall be bound to come to the place indicated.

6-A. *On receipt of information of any death, the Plague authority shall immediately register the death and give the informant a certificate that the death has been registered.

Registration of deaths by Plague authorities.
Notification No. 1968—1431-P., dated the 10th April 1897.
Corpses not to be disposed of until death has been registered.
*Resolution No. 2161-A.—1617-P., dated the 23rd April 1897.

6-B. It shall not be lawful to carry any corpse to the place of cremation or burial,* or to a tower of silence, unless the bearers are in possession of a certificate given under Rule 6-A that the death has been registered. In the event of a corpse being carried in contravention of this rule, Plague authorities and all policemen on duty are empowered to demand the name, sex, age, caste and residence of the deceased and to detain one of the funeral party until the information is truly given.

"In any town or village or other area to which this rule shall be applied by the District Magistrate, an occupant of a house or building or the principal surviving member of a family shall give immediate information to the nearest Plague authority of (a) any sickness, (b) any death, (c) the arrival, at the house or building, of any person from any place declared by the District Magistrate to be infected."

Notification No. 5880—3854, dated 25th October 1897.

7. Immediately on receiving information under Rules 3, 4, 5, or 6, or whenever he thinks house visitation necessary, the Plague authority shall go to the place indicated, and if the place be a house or dwelling-place and if the occupants thereof do not (on his demand) allow him to enter and give him reasonable facilities for ascertaining whether any of the inmates are suffering from the plague, such authority is empowered to enter into such house or any part thereof by force, and to detain, for the purpose of medical examination, any person found therein to be suffering or suspected to be suffering from the plague, or in his opinion likely to have been infected, *e.g.*, owing to his having lived in the same house with a plague patient.

Investigation by Plague authority on receipt of information of plague cases.

7-A. A Plague authority is empowered to detain in a place of observation appointed by him, for a period not exceeding ten days, any person found within the limits of the jurisdiction of such Plague authority, who is in the opinion of the latter likely to have been infected. A Plague authority is also empowered to take any measures for the disinfection of the clothing, or the articles likely in his opinion to be infected, of any person thus detained, or of any person, whether detained or not, who is in his opinion likely to have been infected, and such persons shall be bound to submit to such measures and to remain in the appointed places of detention till permitted by the Plague authority concerned to leave them.

* Notification No. 4692—3121 P., dated 30th August 1897.

8. A Plague authority is empowered to have the cause of death inquired into in all cases, and, unless satisfied, to treat it as a plague case.

Enquiry into cause of death.

Examination
and segregation
of persons suffer-
ing or suspected
to be suffering
from plague.

9. Every medical officer appointed under these rules as a Plague authority is empowered to examine all persons whom he discovers or about whom he receives information under the provisions of Rules 3, 4, 5, 6, or 7, and to detain and segregate persons suffering or suspected by him to be suffering from the plague, in such places as may be appointed by the District Magistrate or officer specially deputed by him in this behalf for the accommodation of such persons respectively. For the purpose of segregating people the District Magistrate or officer specially authorised by him in this behalf may take possession of and occupy any vacant ground or building, such compensation being afterwards made to the owner or occupier thereof as may be fixed by a Panch as provided in Rule 15.

Prohibition of
the use of infect-
ed and insani-
tary buildings.

10. If a Plague authority who is specially appointed in this behalf by the District Magistrate has reason to believe that any building intended or used as a dwelling is or has been occupied by a sufferer from the plague, or if it appears to him that any such building is in such an insanitary condition as to be unfit for human habitation, he may prohibit by a written order the further use of such building as a dwelling-house.

When any such prohibition has been made, no owner or occupier of such building shall use or suffer the same to be used for human habitation until the said officer gives him written permission in this behalf.

For the purpose of enforcing this regulation, the said officer may, if necessary, forcibly remove or cause to be removed any person from such building.

Abatement of
overcrowding.

11. If it shall appear to a Plague authority of the description stated in Rule 10 that any building used as a dwelling is so overcrowded as to endanger the health of the inmates thereof, he may, by written order, require the owner or occupier of the building, within a period to be fixed by the said authority, to abate the overcrowding thereof by reducing the numbers of inmates thereof.

For the purpose of enforcing this regulation, the said authority may, if necessary, at the expiration of the time prescribed in the written order, forcibly remove or cause to be removed such and so many of the inmates of the building as shall seem to him to be proper.

Cleansing and
disinfection of
infected and
insanitary build-
ings.

12. In the case of any building ordered to be vacated under Rules 10 and 11 and in the case of any other building or enclosure which may appear to him to be in a filthy or insanitary condition, a Plague authority of the description stated in Rule 10 may require the owner or occupier to carry out, or in his default may of his own motion carry out, such measures as may seem necessary to him for the purpose of cleansing or disinfecting such building or premises, and

for the purpose of such cleansing or disinfecting may, if necessary, forcibly break open and enter any such building or part of such building or premises, and may remove and disinfect or destroy any goods, clothes or other articles found therein. The said Plague authority is empowered to enter any building for the purpose of ascertaining whether it is in a filthy or insanitary condition. If the Plague authority considers it necessary, he may, of his own motion, immediately and without previous notice, carry out such measures for cleansing and disinfecting as he considers necessary.

13. Such Plague authority as aforesaid is empowered with the consent of any First Class Magistrate having jurisdiction in the locality to remove or burn any huts or erections in which a case of plague has occurred or which are likely from their insanitary surroundings or conditions to give rise to the disease,* or the destruction of which appears to him to be necessary to prevent the spread of the plague.

Destruction of infected and insanitary huts.

* Notification Nos. 2867—2164, dated the 26th May 1897.

14. The District Magistrate is empowered to make regulations when he deems it necessary, for prescribing the route which shall be taken by a funeral procession from the place of death to the graveyard, burning ground or other place for final disposal of the corpse and the places (if any) at which such procession may halt, on its way, for funeral prayers, ceremonies or other purposes, for enforcing burial in certain places or at a certain depth and for requiring that quicklime be placed with the corpse; and may prohibit the burial or burning of corpses of persons reasonably supposed to have died of the plague in or upon ground other than that specially assigned by him for such purposes.

Control of funeral processions and regulations for the disposal of corpses.

15. Before the destruction of property of special value under Rule 12 or 13 the value of it shall be assessed by a Panch of three persons, including the President, who shall be an officer appointed by the District Magistrate by name or by virtue of office and by general or special order. The President shall appoint the two other members. Subject to the sanction of the District Magistrate or of any officer specially empowered by him in this behalf, not being lower in grade than a First Class Magistrate, the award of the Panch shall be final and conclusive. A Plague authority is empowered to decide whether an article which it is proposed to destroy is of sufficient value for a Panch to be called to assess its value. If he decides it is not of sufficient value, he may destroy it on the spot, and may in his discretion pay compensation to the owner: provided, however, that no person shall be entitled as of right to claim any compensation whatsoever. It is the desire of Government that Plague authorities should show liberality and promptness in the exercise of their power

Payment of compensation for property destroyed.

to award compensation, and that, for example, a very* poor man should be promptly compensated for the loss of clothes which, though of no special market value, may be of considerable value to him.

Duties of the police.

16. The police shall act under the orders given by any duly appointed Plague authority with regard—

(a) to compelling persons to submit to such regulations as may be made or approved by the medical officers appointed for any locality under these rules for the purpose of inspection, detention and segregation of persons suffering or suspected to be suffering from the plague, and

(b) to carrying out the provisions of these rules.

Duties of District Magistrates.

17. The District Magistrates are to do their utmost, both personally and through others, to make it generally understood that these rules are absolutely necessary for the public safety, and to see that no needless inconvenience is caused to any one, that examinations, etc., are carried out, with as much regard as possible to sex and the customs of the country, and that everything is done to meet the wishes of the patients so far as is compatible with the public safety.

Incidence of expenditure in Municipal Districts.

18. Within a Municipal District the expenses of carrying into effect any of the measures hereby authorized for cleaning or disinfecting any building, or destroying any hut or other property together with the cost of compensation under Rule 15 above, shall, in the first instance, if no other funds have been made specially available for the purpose, be defrayed out of Municipal funds, but shall be recoverable from the owner or occupier of such building or hut under the ordinary provisions of Bombay Act VI of 1873 in the same manner, in all respects, as if the work had been carried out under the provisions of section 77 of the said Act.

Incidence of expenditure outside Municipal Districts.

Notification No. 2987—2240-P., dated the 31st May 1897.

18-A. The whole or any part of the expenses of cleaning and disinfecting any building in rural areas situated outside a municipal district may, at the discretion of the District Magistrate or any Plague authority authorized by him in this behalf, be recovered from the owner or occupier of the building as if the same were a revenue demand under Bombay Act V of 1879, provided that, whenever an order for such demand is made by any Plague authority other than the District Magistrate, the owner or occupier affected thereby shall have the right of appeal to the District Magistrate. The District Magistrate's orders under this rule shall be final.

Disinfection of persons, vehicles, clothes and other property, and destruction of property.

19. The Plague authority may require people to adopt such measures as he thinks fit for the disinfection of their persons, vehicles, clothes and other property when he considers that otherwise, in consequence of the risk of infection to which their persons, vehicles, clothes and other property have been exposed, there

is a danger of plague spreading. If he considers it necessary, he may destroy or order the destruction of such property.

20. The District Magistrate may, with the previous sanction of the Commissioner, prohibit either wholly or subject to such restrictions as he may impose, the holding of fairs, caste feasts or other assemblages which are likely in his opinion to assist the spread of the plague. Prohibition of fairs and other assemblages.

21. All persons practising medicine, whether qualified or not, shall report, within twenty-four hours, to the nearest Plague authority any plague cases or cases of fever with glandular swellings, which come to their notice. Report of cases by persons practising medicine.

22. All persons shall, on demand, give their names and addresses, and mention their business and intentions regarding future movements to Railway Station Masters, Plague authorities and any other persons whom District Magistrates may empower to collect such information. All persons, on demand, to state names, addresses, business and future movements.

23. When a person dies of the plague elsewhere than within the limits of a hospital, no one shall touch the corpse, except those who undertake the necessary duties of preparing it for the funeral. Such persons shall disinfect themselves according to the orders of the Plague authority or person authorized by the Plague authority. Persons touching plague corpses.

24. Every person passing by any chauki or other place provided by the District Magistrate for the inspection of travellers shall submit to examination if required and to detention in any hospital or quarantine camp which may have been established for that purpose. Persons passing inspection posts to submit to examination and detention.

25. Every Police Patel shall prevent the entrance into his village site of any person believed by him to be suffering from the plague * or likely to have been infected. If there be any such person anywhere within the limits of his village area, he shall either send him in a cart or litter to the nearest isolation hospital, or if it be too far shall forthwith build or allot a hut for him outside the village site and detain him there until the orders of the Mamlatdar are received. The companions of any such person shall also not be allowed to enter the village site, but the Patel shall send them such supplies as they may require and shall give them reasonable assistance to accommodate themselves in the field during their detention. Persons believed to be suffering from plague not to be allowed to enter villages. They are to be sent to isolation hospital or detained under shelter outside the village.

26. Cancelled.

27. District Magistrates or Plague authorities are empowered to break holes in the walls or roofs of houses or to remove roofs altogether for the purpose of admitting light and air. Admission of light and air into houses.

Evacuation of
infected locality.

28. A District Magistrate is empowered to direct the évacuation of houses in the neighbourhood of an infected house or of a block of houses or a particular locality and to prohibit re-occupation of such houses or locality without permission. Notice for such period as the District Magistrate thinks suitable should be given, and temporary accommodation should be provided.

Prevention of
the passage of
suspicious per-
sons from one
place to another
until they have
undergone ob-
servation and
their effects have
been disinfected.

* Notification
No. 3285—
2425-P., dated
the 15th June
1897.

29. *Plague authorities specially appointed by a Commissioner for this purpose are authorized to prevent the passage of suspicious persons from any town, village or local area, or into any town, village or local area to which this rule may be applied by the Commissioner, unless such persons have been detained in a place of observation for a period prescribed by the Commissioner and unless if arrangements for disinfection of their clothing, baggage, etc., have been made under the Commissioner's orders such disinfection has been effected. Such Plague authorities shall have the widest discretionary power, subject to the general or special orders of the Commissioner, to decide what person shall be considered "suspicious" for the purposes of this rule. So long as he remains in a place of observation under this rule, no person shall be allowed to communicate, except with the permission of the Plague authority with persons outside the limits of the place. He shall obey such orders as may be issued by the Plague authority for the cleanliness or protection from infection of the persons, property or quarters of the persons detained.

Closing of food
supply places in
infected locali-
ties.

30. A District Magistrate or Plague authority especially authorized by him in this behalf is empowered to close places used for the supply, preparation or storage of articles of food and drink in infected localities or in the immediate neighbourhood of infected houses and to direct the removal of all articles of food and drink found in such places.

Control of the
removal of
plague patients.

31. A District Magistrate is empowered to prohibit the removal of plague patients from houses or sheds, except in accordance with regulations framed by himself, and to take such steps as may be necessary to enforce such prohibition.

Penalty.

†Notification
No. 3999—
2777-P., dated
the 29th March
1897.

32. †Whoever shall disobey any regulation prescribed by Government in these rules or obstruct any measure which has been taken by Government, or which the District Magistrate or Plague authority has been required or empowered to take under these rules, shall be liable to be prosecuted under section 188, Indian Penal Code.

33. The provisions of this Notification are not intended to, and shall not, operate to limit in any way the powers which either the District Magistrate or, within a Municipal District, the Municipality may possess independently of the powers hereby conferred.

The foregoing rules are applicable throughout the Bombay Presidency and Sind, except in the City of Bombay, subject to the following modifications in the case of cantonments and hill stations in charge of Superintendents :—

In the case of cantonments, substitute* "General Officer in Command" for "Commissioner" and "Cantonment authority" for "District Magistrate."

* Notification No. 2165—1620-P., dated the 24th April 1897.

In the case of hill stations in charge of Superintendents, substitute "Superintendent" for "District Magistrate."

Appointment of a Plague Committee for Poona.†

No. 20.

Notification No. 1272—765-P., dated the 9th March 1897.

In exercise of the powers conferred by sub-section (1) of section (2) of the Epidemic Diseases Act, 1897, and of the powers in this behalf conferred by the Governor General in Council under section 2, sub-section (3), of the same Act, the Governor in Council is pleased to direct as follows :—

1. The following gentlemen are constituted a Committee for the purpose of carrying out, under the orders of Government, the measures to be taken to suppress and prevent the spread of bubonic plague within the limits of the City and Suburban Municipalities of Poona and the Poona Cantonment :—

Mr. W. C. Rand, I.C.S.—*Chairman.*

Lieutenant-Colonel C. R. Phillips.

Surgeon-Captain W. W. O. Beveridge.

2. For the purposes of plague operations, the Committee shall exercise authority and control over the whole establishments of the City and Suburban Municipalities of Poona and the Poona Cantonment Committee. They may add to those establishments to such extent as they think necessary and may remove from them any persons whom they consider unfit for their posts.
3. The Committee may temporarily either rescind, suspend, alter or modify any bye-law, rule or order already made or issued by either of the City and Suburban Municipalities of Poona or the Poona Cantonment Committee, or by any Committee appointed by either of the said bodies, to such extent as they consider necessary or advisable in order to suppress and prevent the spread of the plague.

† The Government of Bombay issued notifications appointing similar Committees for Karachi, Hyderabad, and Sukkur and Rohri. The rules for these Committees were the same as those for the Poona Committee.

Committee may incur expenditure out of local funds.

4. The Committee may incur such expenditure out of the funds of the Municipalities and the Cantonment Committee as they may consider necessary for the performance of their duties, and in order that sufficient funds may be available for plague operations they may control the expenditure of the Municipalities and the Cantonment Committee on objects unconnected with the plague.

Search of buildings. Examination and segregation of suspected cases.

5. The Committee may cause any building or enclosure to be entered and searched for the purpose of ascertaining whether any of the inmates or occupants are suffering from the plague or whether any corpse is concealed therein, and may cause any persons found therein to be examined in order to ascertain whether any of them are suffering from the plague. They may further cause any person to be detained for medical examination and segregate, in such place as they may appoint for the purpose, any person found or suspected, after examination by a medical officer, to be suffering from the plague.

Segregation of inmates of infected building.

6. If the Committee have reason to believe that any building is or has recently been occupied by a sufferer from the plague or that any death which has not been certified by a medical officer holding Her Majesty's Commission, or some other medical officer empowered by the Committee to certify in this behalf, to be due to some cause other than the plague, has occurred in any building, the Committee may cause the inmates of such building to be segregated in such place as they may appoint for a period not exceeding ten days, and may prevent such building from being used as a human habitation in the meanwhile.

Insanitary buildings.

7. If the Committee are of opinion that any building is in such an insanitary condition as to be unfit for human habitation, they may prohibit the further use of such building as a dwelling-house.

When such prohibition has been made, no owner or occupier of such building shall use or suffer the same to be used for human habitation until the Committee give him permission in this behalf.

For the purpose of enforcing this regulation, the Committee may, if necessary, forcibly remove or cause to be removed any person from such building.

Abatement of overcrowding.

8. If it shall appear to the Committee that any building used as a dwelling is so overcrowded as to endanger the health of the inmates thereof, they may by written order require the

owner or occupier of the building, within a period to be fixed by the Committee, to abate the overcrowding thereof by reducing the number of inmates thereof.

For the purpose of enforcing this regulation, the Committee may, if necessary, at the expiration of the time prescribed in the written order forcibly remove or cause to be removed such and so many of the inmates of the building as shall seem to them proper.

9. In the case of any building ordered to be vacated under Rule 6, 7, or 8 and in the case of any other building or enclosure which may appear to them to be in a filthy or insanitary condition, the Committee may require the owner or occupier to carry out, or may of their own motion carry out, such measures as may seem to them necessary for the purpose of cleansing, ventilating or disinfecting such building or enclosure, and for the purpose of such cleansing, ventilating or disinfecting may, if necessary, forcibly break upon and enter any such building or enclosure, and may remove and disinfect or destroy any articles found therein. Cleansing, ventilation and disinfection of buildings.
10. The Committee are empowered to remove or burn any huts or temporary erections in which a case of plague is believed by them to have occurred. Destruction of huts and temporary erections.
11. The Committee are empowered to make regulations, when they deem necessary, for the purpose of enforcing burial in certain places or at a certain depth and for requiring that quicklime be placed with the corpse; and may prohibit the burial or burning of corpses of persons reasonably supposed to have died of the plague in or upon ground other than that specially assigned by them for such purpose. Disposal of corpses.
12. The Committee may for the purpose of military camps, segregation camps, hospitals, burial grounds, warehouses or offices take possession of and occupy any vacant ground or building either within or without the limits of the City and Suburban Municipalities of Poona and the Poona Cantonment, such compensation being afterwards made to the owner or occupier thereof as may be awarded by a Panch constituted as provided in Rule 13. Occupation of land and buildings for segregation camps, etc.
13. Before the destruction of property of special value under Rule 9 or 10, the value of it shall be assessed by a Panch consisting of the Poona City Magistrate and two other members appointed by him. The award of the Panch Compensation.
Notification No. 3411—2493-P., dated the 24th June 1897.

shall be final and conclusive. Any member of the Committee, or any person specially appointed by them in this behalf, is empowered to decide whether an article which it is proposed to destroy is of sufficient value for the said Panch to be called to assess its value. If he decides it is not of sufficient value, he may destroy it on the spot, and may in his discretion pay compensation to the owner: provided, however, that no person shall be entitled as of right to claim any compensation whatsoever. It is the desire of Government that the authorities mentioned in this rule should show liberality and promptness in the exercise of their power to award compensation, and that, for example, a very poor man should be promptly compensated for the loss of clothes which, though of no special market value, may be of considerable value to him.

Impress of
vehicles and
beasts.

14. The Committee are empowered to temporarily impress carts or other vehicles ordinarily let for hire with the beasts necessary to draw them and labourers or coolies, and to make payments for the same at rates fixed by the Committee.

Local Bodies
to carry into
effect measures
ordered by the
Committee.

15. The City and Suburban Municipalities of Poona, the Poona Cantonment Committee, and all the officers and servants of those Municipalities and of that Committee, and all public servants and all persons employed by the Committee, shall carry into effect, without delay, any measures which may be ordered by the Committee.

District
Superintendent
of Police to
assist.

16. On the requisition of the Committee, the District Superintendent of Police, Poona, shall give such assistance as may be necessary in order to enforce immediate compliance with any order of the Committee.

Reports by
householders.

17. The principal occupant of a house or building or the principal surviving member of a family shall give immediate information to the Secretary of the Municipality or Cantonment within the limits of which the house or building is situated of the occurrence in the house or building or amongst the members of the family of—

(a) any sickness due or likely to be due to plague,

(b) any death, whatever may be the cause of it.

Notification No.
5897—3890-P.,
dated 27th
October 1897.

And of the arrival in the house or building of any person (1) suffering or apparently suffering from plague, (2) coming from a house or building within which the said principal occupant knows or has reason to believe that a case of plague has occurred within the ten days next preceding such arrival.

- A. No person shall remove any sick person from one place within the Municipal or Cantonment limits to any other place unless he has reported the case to the Municipal or Cantonment Office, and has, after medical examination of the case, received a permit to remove the case. The permit shall state to what place the sick person may be removed, and it shall not be lawful to remove that person to any place other than that stated in the permit. And no person shall remove any corpse from the place at which the death occurred, except as provided in Rule 19.
18. On receipt of information of any death, the Secretary shall immediately register the death and give the informant a certificate that the death has been registered. The informant may be detained and required to guide to the place where the corpse is lying the officer appointed by the Committee to ascertain the place of death. Death certificates.
Notification No. 2591-A—1988-A. P., dated the 12th May 1897.
19. It shall not be lawful to carry any corpse to the place of cremation or burial unless the bearers are in possession of a certificate given under Rule 18 that the death has been registered. In the event of a corpse being carried in contravention of this rule, all persons acting under the orders of the Committee and all policemen on duty are empowered to demand the name, sex, age, caste and residence of the deceased and to detain one of the funeral party until the information is truly given. Corpse not to be disposed of without death certificate.
20. All expenses incurred in carrying out any of the measures hereby authorized shall, in the first instance, be paid out of the Municipal funds of the City and Suburban Municipalities of Poona and the Poona Cantonment Fund in such proportions as the Committee may determine, but the Committee may recover from any person any amount which such person would, under similar circumstances, be liable to pay to either of the said Municipalities or to the Cantonment Committee under any law for the time being in force. Incidence of expenditure.
21. The powers conferred upon the Committee by these rules may be exercised by such persons as they may from time to time empower, in that behalf. All persons so empowered will, however, act subject to the control of the Committee. Delegation of authority.
22. Disobedience to any orders issued under these rules by the Committee or any person acting under their authority will subject the offender to a prosecution under section 188, Indian Penal Code. Penalty.

Committee to exercise powers in Haveli Taluka.

23. The Committee may exercise the powers conferred on them by Nos. 5, 6 and 9 of these rules throughout the Haveli Taluka of the Poona District.

Notification No. 1190—1629-P., dated the 24th April 1897.

Information of suspicious cases by Government officers. No. 21.

RESOLUTION No. 1155—653-P., dated the 4th March 1897.

Every officer of every Department of Government is hereby directed to give information at the nearest Police Station or Mamlatdar's office of every suspicious case of illness and every death likely to be plague which comes to his notice.

2. This instruction should apply to every officer, however menial, of every Department, whether Imperial or Provincial. Court bailiffs, postal runners, letter carriers, forest guards, etc., are officers who might hear of cases in remote villages.

*Resolution regarding Dhobies.**

No. 22.

RESOLUTION No. 1160—659-P., dated the 4th March 1897.

Telegram from the Commissioner in Sind, No. 223, dated the 2nd March 1897 :—

" Under Act 3 of 1897, please sanction rule prohibiting dhobies washing clothes, except in accordance with provisions of a license to be granted by District Magistrate. Cases of plague have occurred among dhobies. Making regulations necessary. "

RESOLUTION.—The following notification to be issued :—

" Under Act III of 1897, His Excellency the Governor in Council is pleased to prescribe, as a temporary regulation, that no dhobies in places in Sind to which this rule may be extended by the Commissioner shall wash clothes, except in accordance with a license granted by District Magistrate. "

2. Commissioners of Divisions should report whether they consider a similar rule desirable for the Presidency proper.

Regulations for Karachi.

No. 23.

Notification No. 1518—970-P., dated the 17th March 1897.

Under the provisions of the Epidemic Diseases Act, III of 1897,

* Washermen.

His Excellency the Governor in Council is pleased to prescribe the following rules for the area comprised within the limits of the Karachi Municipality:—

1. (a) If it shall appear to the President of the Municipality that any building used as a dwelling is so overcrowded as to endanger the health of the inmates thereof, he may, of his own motion, by written order, require the owner of the building, within a time, not exceeding seven days, to be prescribed in the said order, to abate the overcrowding thereof by reducing the number of lodgers, tenants or other inmates of the said building. Abatement of overcrowding.
- (b) If the owner of the said building shall have sub-let the same, the landlord of the lodgers, tenants or other actual inmates of the same shall for the purpose of this section be deemed to be the owner of the building.
- (c) It shall be incumbent on every tenant, lodger or other inmate of the building to vacate on being required by the owner so to do in pursuance of any such requisition.
2. (a) Save such compensation, if any, as the President or any of the officers deputed by him in this behalf may in his or in their discretion allow, no person shall be entitled to recover any compensation by way of damages or otherwise for the destruction or disinfection of any article removed or dealt with as provided in Rules heretofore sanctioned or which may hereafter be sanctioned by the Commissioner in Sind under the Epidemic Diseases Act. Payment of compensation.
- (b) The owner of any moveable property in any building dealt with under the powers conferred on the Municipality shall be responsible for taking charge of such property, at the time when any action is taken under such powers or, in the case of an article requiring disinfection, so soon as the same has been disinfected, and in default of his so doing, the officer in charge of the operations may cause such property to be placed wherever he may think fit, and neither the owner nor any person interested therein shall have any claim for compensation, damages or otherwise in respect of loss of or damage to such property, however caused, during the removal thereof or at any time thereafter. Charge of property.
3. (a) If in the opinion of the President any building (not being a hut or shed) which has been vacated, or which has Demolition of buildings.

been dealt with under the powers conferred on the Municipality, cannot be adapted to the sanitary requirements of a dwelling, or is otherwise permanently unfit for human habitation, or if its existence is a source of danger, the President may demolish the same or any part thereof.

Valuation.

- (b) Prior to any such building being demolished, the President shall cause the same, or such part thereof as he may think necessary to demolish, to be surveyed and its value at the time to be assessed by such person as Government may, by name or by virtue of office, appoint for that purpose, and shall by written notice affixed on some conspicuous part of such building intimate the date (not being less than seven days from the date of such notice) and the hour at which the building will be surveyed and assessed as aforesaid, and the work of demolition shall not be commenced until the building or portion thereof has been surveyed and the value so assessed. The valuation of such building by such officer shall be final and conclusive, and the owner shall be entitled to receive the amount thereof, which shall be provided out of the Municipal fund, but he shall not be entitled to receive any further or other sum by way of compensation.

Building materials.

- (c) The materials of any building or part of a building demolished as aforesaid shall be the property of the Municipality, and shall be removed and disposed of, or, if necessary, destroyed by the President.

Rule of assessment.

- (d) In assessing the value of any building, regard shall be had only to the then actual market value of the structure, and no allowance shall be made, nor shall any compensation be paid, for compulsory demolition or otherwise.

Control of intercourse.

The President, Karachi Municipality, is empowered to order persons or classes of persons to leave a certain place for another or prohibit leaving a given area, prohibit communication between certain areas, prohibit entrance of persons within a prescribed area, make regulations for inspection of travellers by land or water, and, if necessary, their detention and segregation, and for the destruction of suspected articles. All persons concerned shall be bound to obey such orders, prohibitions and regulations.

No. 24. *Regulations regarding the keeping of Pigs.**

Notification No. 1677—1154, dated the 26th March 1897.

* His Excellency the Governor in Council is pleased to make the following rule under Act III of 1897 for application within the limits of the Municipality of Bandra :—

Pigs shall be kept out of buildings used for human habitations.

Pigs shall not be kept, excepting in enclosures fenced in or otherwise secured, so that they cannot escape therefrom.

Any swine straying may be forthwith destroyed and the carcass disposed of as the President or Secretary of the Municipality shall direct, and no claim shall lie for compensation for any swine so destroyed.

No person shall feed any animal or suffer or permit any animal to be fed or to feed with or upon excrementitious matter, dung, stable refuse or other filthy matter.

No. 25. REGULATIONS FOR THE CONTROL OF RAILWAY AND
OTHER TRAFFIC.

Rules for principal inspection stations.

Notification No. 723—211-P., dated the 10th February 1897.

Memorandum by the Remembrancer of Legal Affairs, No. 187, dated the 8th February 1897.

Submits, with remarks, rules framed under Act III of 1897 for the inspection of passengers by railway travelling in trains from Bombay.

RESOLUTION.—In accordance with the Dangerous Epidemic Diseases Act III of 1897, His Excellency the Governor in Council is pleased to make the following rules :—

(1) Every train coming from the direction of Bombay to any of the stations to which these rules may be declared by Government to be applicable shall be stopped at such station and shall not be taken further until the inspection provided by these rules has been carried out, and until the guard in charge of such train has obtained a certificate from the Chief Medical Officer in charge of the inspecting staff to the effect that all persons proceeding further by the said train, whether railway servants or passengers are free from bubonic plague.

Detention of
trains.

* These regulations were afterwards extended to the Municipalities of Thana and Bassein.

**Platform
inspection of
passengers.**

(2) Every such train shall be emptied for inspection of the passengers in such manner as the Chief Medical Officer on duty may direct, and all such facilities shall be afforded by the servants of the Railway Company as the Chief Medical Officer on duty may deem to be necessary for the purpose of inspecting—

(a) persons who have come by such train, whether they intend to proceed by it or not, and

(b) persons who intend to start from any of the said stations and to travel by such train.

In particular the doors of all railway carriages shall be locked at the station at which the train last stops before arrival at the station appointed for the inspection of passengers under these rules.

**Appointment
of inspecting
officers.**

(3) The Governor in Council may appoint any person or persons, by name or by virtue of office, to be the inspecting medical officer or officers for the purposes of these rules and may cancel any such appointment.

**Inspection and
segregation.**

(4) Inspecting medical officers appointed under these rules are empowered to examine all persons arriving by or intending to leave by the trains mentioned and to detain persons suffering or suspected by them to be suffering from bubonic plague in such places as may be appointed for the accommodation of such persons respectively.

Duties of Police.

(5) The Police shall act under the orders given by the Chief Medical Officer on duty under these rules with regard to compelling persons to submit to such regulations as may be made or approved by the said officer for the purpose of inspection and with regard to the detention and segregation of persons suffering or suspected to be suffering from bubonic plague.

Penalty.

(6) Disobedience to any orders issued under the above rules Nos. 1, 2, 4 and 5 will subject the offender to a prosecution under section 188, Indian Penal Code.

**Kalyan and
Palghar.**

2. For the present Kalyan on the G. I. P. Railway and Palghar on the B., B. & C. I. Railway are prescribed as railway stations to which the above rules are applicable.

Staff.

3. The Surgeon-General should be instructed to send 12 medical subordinates and a commissioned medical officer to each of these stations. The officers despatched by him shall be considered to be inspecting officers under rule (3).

Expenditure.

4. The Collector of Thana should arrange for any contingent expenditure that may be necessary. He may incur such expenditure in anticipation of sanction. He has already been instructed to arrange

for separate places for the detention of persons suffering from the plague and of persons suspected to be suffering therefrom, and to make provision for the accommodation of the medical staff to be employed.

5. The Police and the Railway authorities are requested to give all possible assistance to the medical staff. Duties of police and railway authorities.

6. The inspection referred to in the above rules should commence not later than the 12th instant.

No. 26. Notification No. 751—249-P., dated the 11th February 1897.

Read Government Resolution No. 723—211-P., dated the 10th February 1897.

RESOLUTION.—In addition to Kalyan and Palghar the following railway stations are prescribed as those to which the rules in paragraph 1 of Resolution No. 723—211-P., dated the 10th instant, are applicable:—

Ahmedabad.	Hotgi.
Bhusaval.	Londa.

2. The inspecting medical officers for the purposes of the aforesaid rules shall be those whom the Surgeon-General from time to time appoints for the duty. The Surgeon-General should send Government from time to time a nominal list of such officers and keep Government informed of all transfers and other changes in the staff of such officers. Inspecting Medical Officers.

3. Arrangements have already been made for inspection at Kalyan and Palghar. They should be promptly made for inspection at the other railway stations mentioned in paragraph 1 above. These arrangements should include a hospital for bubonic plague patients, separate accommodation for persons suspected to be suffering from bubonic plague, and accommodation for the medical staff. The Collectors of the districts concerned should make these arrangements promptly, incurring the necessary expenditure which may in the first instance be debited to Government. Provision of accommodation.

4. As an additional rule under the Epidemic Diseases Act of 1897, the Governor in Council is pleased to prescribe that—"Persons suffering or suspected to be suffering from bubonic plague found at railway stations shall not be permitted to travel by rail, or to return to their homes, or to depart elsewhere, but must be taken to the hospital or a place of detention provided for the purposes of the rules." Detention of persons suffering or suspected to be suffering from Plague.

No. 27. Notification No. 1123—608-P., dated the 2nd March 1897.

RESOLUTION.—Dhond and Rajevadi are hereby added to the railway stations mentioned in paragraph 2 of Government Resolution Dhond and Rajevadi.

No. 723—211-P. of the 10th February 1897, and in paragraph 1 of Government Resolution No. 751—249-P. of the 11th idem.

Rules for Minor Inspection Stations.

Notification No. 883—351-P., dated the 17th February 1897. **No. 28.**

The following rules have been prescribed by His Excellency the Governor in Council in accordance with section 2 (2) (a) and (b) of the Epidemic Diseases Act, 1897:—

Inspection at
other railway
stations and at
landing places.

1. At any railway station within the Presidency of Bombay* other than the stations to which the rules published in Government Notifications Nos. 723—211-P., and 257-P., dated respectively, the 10th and 11th February 1897, and No. 884—352-P. of this date are applicable, or at any bund or landing-place within the said Presidency and outside the limits of the Port of Bombay at which a medical officer or medical officers may be appointed by the Government or the local authority, or with the sanction of the local authority, by a railway or shipping company, as the case may be, for the purpose of inspection under these rules, such officer or officers shall be empowered to examine—

Examination of
persons arriving
or departing by
rail or vessel.

- (a) persons, whether passengers, railway servants or members of a boat's crew, who alight or disembark at such place from a train or boat or vessel coming from the direction of Bombay, whether they intend to proceed by such train boat or vessel or not, and
- (b) persons who intend to start from any of the said places and to travel by such train, boat or vessel.

All such persons shall be bound to submit to such inspection as the medical officer on duty under these rules may deem necessary.

Local authority.

2. For the purpose of these rules "local authority" means the District Magistrate and any one empowered by him in this behalf, and within Municipal Districts includes the Municipality.

Inspecting medi-
cal officers.

3. All inspecting medical officers appointed at such places as aforesaid before the passing of these rules shall be deemed to have been appointed under these rules, subject to the approval of the District Magistrate or of any one empowered by him in this behalf.

Segregation of
suspected cases.

4. All inspecting medical officers appointed under these rules are empowered to detain persons suffering from, or suspected by them to be suffering from, the dangerous disease known as bubonic

* In Notification No. 884—352-P., dated the 17th February 1897, the Government of Bombay issued similar rules for Sind, outside the limits of the Port of Karachi.

plague, in such places as may be appointed for the accommodation of such persons, respectively.

5. The Police shall act under the orders given by the medical officer on duty under these rules with regard to compelling persons to submit to such regulations as may be made or approved by the said officer for the purpose of inspection and with regard to the detention and segregation of persons suffering or suspected to be suffering from bubonic plague.

6. Disobedience to any orders issued under the above rules 1, 4 and 5 will subject the offender to a prosecution under section 188, Indian Penal Code.

No. 29. Resolution No. 991—460-P., dated the 23rd February 1897.

RESOLUTION.—In continuation of Government Notification No. 884—352-P., dated 17th February 1897, His Excellency the Governor in Council is pleased to prescribe the following rule under the Epidemic Diseases Act, 1897:—

“Railway station masters shall require all passengers coming from infected stations to give ‘names and addresses, business which has brought them to the station and intentions regarding future movements.’ For the present the following shall be considered to be infected stations, *viz.*, all stations in the Island of Bombay and Salsette, Kalyan, Bassein, Bulsar, Rander, Kirkee, Poona, and Ghorepuri. A station master shall forward a copy of his list containing the above information every day to the nearest Mamlatdar, who shall forthwith instruct the headman of the town or village or the Secretary of the Municipality to watch such person and send a report if he is ill or departs within ten days.”

No. 30. Resolution No. 996—471-P., dated the 24th February 1897.

RESOLUTION.—The following is sanctioned as an addition to the rules sanctioned in the Government Resolutions quoted in the margin:—

No. 723—211-P., dated, 10th February 1897.

No. 257-P., dated 11th February 1897.

No. 882—350-P., dated 17th February 1897.

“Europeans or Natives of a class who cannot in the opinion of the Chief Medical Officer be properly accommodated at Palghar or Kalyan shall, if suffering or suspected to be suffering from plague, be sent back to Bombay by train and shall, if Europeans, be sent to the St. George’s Hospital, and if Natives to the Plague Hospital at Parel or

Railway passengers to give names and addresses.

Treatment of Europeans at Palghar and Kalyan.

any other hospital that may be found more convenient. The authorities at the hospitals should be prepared on receipt of an urgent telegram to convey patients from the railway stations (e.g., Victoria Terminus, or Parel or Marine Lines) to the hospitals."

Rules for Sind.

Notification No. 1093—563-P., dated the 27th February 1897. No. 31.

In exercise of the powers conferred by the Notification of the Government of India, No. 302, dated 4th February 1897, His Excellency the Governor in Council being satisfied that Sind is visited by an outbreak of a dangerous epidemic disease, namely, bubonic plague, and that the ordinary provisions of the law are insufficient for the purpose of preventing such outbreak, is pleased to prescribe the following regulations for the inspection of persons travelling by railway and the segregation of persons affected or suspected of being infected with bubonic plague and for other matters under sub-section (2) (b) of section 2 of the Epidemic Diseases Act, 1897 :—

Inspection
stations.

1. All persons travelling by railway, whether passengers or railway servants, from the direction of Karachi or any other place that may hereafter be declared by the Commissioner in Sind to be visited with bubonic plague shall be medically inspected at the

Karachi City Station.
Do. Cantonment do.
Dadu do.
Hyderabad do.

railway stations marginally noted, and at such other railway stations as the Commissioner in Sind may from time to time prescribe or may substitute for any station already prescribed.

Staff.

2. The medical inspection shall be made by a commissioned medical officer appointed by the Principal Medical Officer, Sind District, under the orders of the Commissioner in Sind either expressly for this purpose or in addition to other duties. If such medical officer is at any time unavoidably prevented from discharging his duties under these regulations, he may by order in writing temporarily depute a medical subordinate or another commissioned medical officer, informing the Principal Medical Officer immediately. The officers at present appointed are :—

At Karachi City Station

Do. Cantonment Station

At Dadu

At Hyderabad

... } Surgeon-Lieutenant Rainier, I.M.S.

... Surgeon-Lieutenant Gwyther, I.M.S.

... The Civil Surgeon.

3. The medical inspection shall be conducted at each railway station in the following manner :—

Karachi City Station.

(a) Before commencing the inspection, the medical officer shall satisfy himself that no persons are concealed in the train, that the carriages are locked on both sides, that the platform is clear, and that there is no possibility of any access to the train by any non-inspected person. It shall be the duty of the station master and of the Police to carry out these provisions to the satisfaction of the medical officer.

(b) If found convenient, intending passengers may be arranged on the platform for inspection and passed one by one into the carriages, or may be inspected one by one as they pass to the platform through the gate where they are required to show their tickets. In the latter case, they shall at once take their seats in the carriages. As soon as the inspection is finished, the train, all carriages being locked on both sides, will proceed to the Cantonment Station accompanied by the medical officer.

Karachi Cantonment Station.

(a) Before arrival of the train at the Karachi Cantonment Station, the side away from the platform should be guarded by Police to prevent access to the train on that side. All intending passengers should be drawn up on the platform, arranged by families or otherwise as may be most convenient for passing persons after inspection into the carriages without possibility of any non-inspected person eluding inspection.

(b) As soon as the inspection is finished, the doors may be unlocked on both sides under proper precautions. After the doors have been unlocked, no person shall enter the train, and the train shall at once leave the station. The doors shall not be unlocked till the station master has satisfied himself that every person intending to travel has taken his seat (except the guards in charge of the train) that the train can start at once, and that the police on both sides of the train have cleared away all by-standers. The medical officer will see that these regulations are strictly observed.

Dadu Station.

(a) All persons intending to travel by the up-train from Karachi will remain outside the platform till the inspection of persons arriving by the train is completed. It shall be the duty of the station master to see that the platform is kept clear of all persons, except those actually on duty or who may be permitted by the medical officer to

remain. The medical officer shall see that the platform is clear and properly guarded, and that police are stationed to prevent any persons leaving the train on the side away from the platform.

(b) On arrival of the train at Dadu, all the carriages shall be immediately locked on the side away from the platform. At the station immediately preceding Dadu the guard of the train shall lock all carriages on the side that will be next the platform on arrival at Dadu.

(c) On arrival of the train, each carriage separately or two at a time will be unlocked. The occupants of the carriage shall alight on the platform and be there inspected by the medical officer. Those who do not wish to proceed farther will after inspection be allowed to depart. Those who wish to proceed will re-enter the carriage. As the inspection of each carriage is completed, the empty carriage shall be searched to ascertain that no person is concealed in it, the inspected persons shall reseat themselves, and the doors be relocked. When all the persons arriving in the trains have been thus inspected and reseated, the medical officer shall inspect the local passengers from Dadu intending to proceed by the train. He may either direct that the passengers be drawn up on the empty platform for inspection or inspect them as they show their tickets. In either case after inspection the inspected persons shall forthwith enter the carriage which is unlocked for the purpose.

(d) As soon as the inspection is completed, the doors of the train shall be unlocked on both sides under the same precautions as are prescribed for Karachi Cantonment Station.

Hyderabad Station.

The arrangements shall be the same as at Dadu.

N.B.—No train shall leave any of the above stations without a certificate to be given by the medical officer to the guard in the form annexed, and to be shown by the guard when so required.

4. At the prescribed platform inspecting stations no passenger shall enter a train or remain in a train without inspection. The inspection of females shall be conducted with due regard to custom.

5. After inspection of any person, the medical officer shall have power to and shall detain any person suffering from or suspected to be suffering from or infected by bubonic plague or any person whom the medical officer has reason to believe may have contracted the disease or be likely to spread infection and to keep such persons under observation in temporary accommodation provided for the purpose for so long as he may deem necessary. The medical officer shall keep a

No passenger
to enter or
remain in train
without exami-
nation.

Females.

Detention of
suspected cases.

register of all persons detained and released or have died, with full particulars.

6. It shall be the duty of the medical officer, in the absence of other arrangements, to attend on any person so detained and accepting his services, and to see that the accommodation provided is suitable and sufficient, and that, if necessary, provisions, water and firewood are supplied, and immediately to bring to notice of the Principal Medical Officer or the Collector of the District any defect in the arrangements.

Accommodation and treatment of person detained.

7. No person thus segregated shall quit the place set apart without permission of the medical officer. It shall be the duty of the police to prevent any person leaving till permission is given.

Person segregated not to depart without permission.

8. The medical officer shall have power to seize and disinfect or burn all clothing, bedding or other articles, which may, in his opinion, be infected, and shall value and pay compensation on the spot. A permanent advance of Rs. 100 shall be provided to each officer by the Collector of the District. The medical officer shall keep accounts and submit bills and vouchers in such way as the Collector may require. The medical officer may, after allowing any person to quit the segregated area, furnish a ticket to such person to his house if such person has not the means of buying a ticket. Provided that the railway will be bound to refund to the medical officer the excess value of the ticket of all persons detained.

Disinfection or destruction of clothing, bedding, etc.

9. The medical officer will see that there is separate accommodation for the sick and for the healthy persons detained, or who may elect to stay with a person who is detained. Any friend or relative may be permitted to stay with a person detained, and one or two persons shall be permitted to attend on any sick person. Every reasonable attention shall be paid to the comfort of persons detained, and complaints that he cannot meet shall be forwarded by the medical officer to the Collector of the District, with his remarks as to whether the complaint is reasonable or otherwise.

Separate accommodation for the sick and healthy. Friends and relatives permitted to stay with patient. Comfort of patient.

10. Nothing in the above regulations shall affect the inspection of passengers entering or alighting from a train at other stations on the line by such persons as the Principal Medical Officer under instructions from the Commissioner in Sind has appointed or may appoint.

Minor inspections.

Form of a Certificate to be furnished by the Inspecting Medical Officer to the Guard of the Train.

I hereby certify that I have examined all the passengers and railway servants proceeding by theTrain leaving.....
.....Station, North-West Railway, at.....hours.....minutes, and

that so far as I could ascertain they are free from suspicion of bubonic plague, and the Regulations for inspection were duly observed.

Station.....

Date.....

Inspecting Medical Officer.

Inspection of up trains in and near Bombay.

No. 32.

Notification No. 2914—2194-P., dated the 28th May 1897.

The following rules are issued under Act III of 1897 :—

1. The Bombay Plague Committee are hereby empowered to appoint medical men as plague authorities at railway stations in the Island of Bombay and the Thana District for the purposes of these rules. Such plague authorities shall have power to inspect railway passengers, intending railway passengers and other persons found in railway trains or at the railway stations to which these rules are or may hereafter be applied, and to detain and send to hospitals or other places appointed for the purpose persons found or believed to be suffering from plague.

2. These rules are hereby made applicable to the railway stations of Thana, Kurla and Sion on the Great Indian Peninsula Railway, and Santa Cruz and Bandra on the Bombay, Baroda and Central India Railway.

3. The medical staff appointed by Government at the stations of Kalyan and Palghar for the purposes of the inspection referred to in Government Resolution No. 723—211-P., dated 10th February 1897, shall be considered plague authorities for the purposes of these rules.

4. On the Great Indian Peninsula Railway persons travelling by up through trains shall be medically inspected at Kalyan and no further medical inspection of such trains will be requisite; but no passengers shall be allowed to enter such trains at any stations between the stations of Kalyan and Kurla except at Thana. All local up trains shall be emptied and their passengers medically inspected at Sion.

5. On the Bombay, Baroda and Central India Railway up trains starting from stations north of Bandra shall be stopped for medical inspections of their passengers at Bandra, except in the case of the up mail train, the passengers by which shall be inspected at Palghar. No persons shall be allowed to book at Bandra Station by up trains until they have been medically inspected.

6. Season ticket-holders and free pass-holders will ordinarily be excused from inspection; but the plague authorities may inspect them in any cases in which they consider it desirable to do so.

7. The plague authorities under these rules shall be placed under the immediate orders of Surgeon-Captain Jennings, who is authorized to make all necessary arrangements and to commence inspection under these rules as soon as his arrangements are completed at the above mentioned places.

No. 33. Regulations issued by the Government of Madras.

Notification, dated Fort St. George, the 5th February 1897.

Regulations for the City of Madras.

Whereas certain parts of India are visited by, and the Presidency Preamble. of Madras is threatened with, an outbreak of a dangerous epidemic disease known as bubonic plague, and whereas the ordinary provisions of law in force in the Presidency are insufficient for the purpose of preventing the outbreak or spread of the disease, His Excellency the Governor of Fort St. George in Council, in exercise of the powers delegated to him under section 2, sub-section (3), of the Epidemic Diseases Act, 1897, by the Governor-General in Council [Notification of the Government of India, Home Department, No. 302 (Sanitary), dated the 4th February 1897], is pleased to prescribe under the said Epidemic Diseases Act the following temporary regulations to be observed in the City of Madras:

1. These regulations shall come into force at once and shall remain in operation until such time as they shall be withdrawn by a notification in the *Fort George Gazette*.

2. Every house-holder who becomes cognizant of any case of the bubonic plague or of fever with glandular swellings in his house or in any other private dwelling within the municipal limits of the City of Madras shall be bound to give information of the same to the Health Officer or a Sanitary Inspector of the Municipality with the least practicable delay. Report of cases by house-holders.

3. The President of the Municipal Commission or any officer generally or specially authorised by him in writing in this behalf may, when he considers necessary, enter upon any premises at any time during daylight and summarily execute any work required under, or summarily abate any of the nuisances described or indicated in, sections 313, 314, 321, 322, 326 or 327 of the City of Madras Municipal Act, 1884. Entry and abatement of nuisances.

4. When in the opinion of the Health Officer of the Municipality and of a medical officer deputed by the Surgeon-General or, in the absence of any such officer, of the Surgeon of the district, any building or place is so overcrowded as to make the inmates or occupant Abatement of overcrowding.

thereof specially liable to an attack of the bubonic plague, the President or any officer generally or specially authorized by him in writing in this behalf may, by notice posted on some conspicuous part of the building or place, require the owner or occupier, if actually residing in the building or place, or the tenants or the actual inmates thereof, to abate as prescribed in the notice the overcrowding within twenty-four hours by reducing the number of lodgers, tenants or inmates of the said building or place; and in default of compliance with the requisition in the said notice may summarily eject all the inmates or occupants, or reduce the number of inmates or occupants in such manner and to such extent as may appear necessary and the owner or the tenants or the inmates of such building or place shall not be entitled to claim any compensation on account of such ejection.

Evacuation,
cleansing and
disinfection of in-
fected buildings.

5. When any building or place has, in the opinion of the Health Officer of the Municipality, been so infected with the plague as to render its further occupation a source of danger to the inmates, tenants or occupants thereof, the President or any officer generally or specially authorized by him in writing in this behalf may summarily cause such building or place to be vacated and thoroughly cleansed and disinfected; and the building or place shall not be re-occupied until in the opinion of the Health Officer it is safe to be re-occupied; and the owner or occupier or the tenants or the inmates thereof shall not be entitled to claim any compensation on account of anything done under this regulation.

Destruction of
huts and sheds.

6. If in the opinion of the Health Officer and of a medical officer deputed by the Surgeon-General or, in the absence of any such officer, of the Surgeon of the district, the destruction of any hut or shed is necessary to prevent the spread of the plague, the President or any officer generally or specially authorized by him in writing in this behalf may summarily take measures for the destruction of such hut or shed and of the materials of which it is constructed; and the President may, in his discretion, give compensation at the expense of the Municipal Fund constituted under Madras Act I of 1884 for any loss or damage caused by reason of such destruction.

Payment of
compensation.

Rags and used
gunny bags.

7. The President may, in his discretion, disinfect or destroy any collection of rags in rag-pickers' houses and rag-stores, or of second-hand gunny bags imported from any part of India infected by the plague, and no person shall be entitled to claim compensation for any loss or damage sustained by him by reason of the disinfection or destruction of any such articles under the powers conferred by this regulation.

8. The Municipal Commissioners shall provide and maintain in such localities, whether within or without Municipal limits, as in the opinion of the Health Officer of the Municipality may be proper for the purpose, suitable and sufficient accommodation as approved by the Health Officer and by a medical officer, deputed by the Surgeon-General or, in the absence of any such officer, by the Surgeon of the district, for the isolation and treatment of persons suffering from or suspected to be suffering from the plague and for their detention until they shall be certified to be free from infection. In the places so provided the Municipal Commissioners shall furnish such hospital establishments, equipment and supplies as the Health Officer may require and shall also make arrangements for feeding persons detained under any of the regulations now prescribed, on payment by them of the cost; but in the case of indigent persons the Commissioners shall supply them with food free of charge; provided that any person so detained may cater for himself subject to such rules and conditions as the Health Officer may prescribe. The Municipal Commissioners shall also in like manner and subject to like approval provide accommodation for persons who may be required to vacate any building or ground under the preceding regulations Nos. 4 and 5 and who may be unable to procure necessary accommodation for themselves.

Establishment
and maintenance
of plague hos-
pitals.

9. Any building or place, whether within or without Municipal limits, which is in the opinion of the Health Officer and of a medical officer deputed by the Surgeon-General or, in the absence of any such officer, of the Surgeon of the district suitable and required for the purpose of the accommodation to be provided under regulation 8 may be entered upon and occupied by the Municipal Commissioners (if untenanted without any notice whatsoever and if tenanted after twenty-four hours' notice in writing conspicuously posted on such building or place) and used for the purposes of the accommodation under regulation 8 as aforesaid; and the owner or the lessee of such building or place shall not be entitled to claim from the Municipal Commissioners anything beyond a reasonable rent for the period during which the building or place may remain in their occupation: provided always the Municipal Commissioners shall be bound at their own cost to cleanse and disinfect the said building or place and, if a building, to white-wash it both internally and externally, before vacating it.

Occupation of
buildings for
plague hospitals.

10. The Municipal Commissioners shall provide suitable conveyances for the free carriage of persons suffering or suspected to be suffering from or infected by the plague and for the transport of any clothing, bedding or other articles which may have been exposed to infection.

Conveyance of
plague patients.

Segregation of
plague patients
in hospital, in
their own houses
or in some other
suitable place.

11. When in any building or place there is a person suffering or suspected to be suffering from the bubonic plague, the President or any officer generally or specially authorized by him in writing in this behalf may enter and either—

- (a) remove him to one of the places of accommodation provided under regulation 8 and in such place or in some other place so provided to which, at the discretion of the Health Officer, he may from time to time be removed there detain and treat him until he shall be certified by the medical officer in charge of the place to be free from infection, or
- (b) take measures for segregating and isolating the said person in his own house or in some other suitable place, if in the opinion of the Health Officer the said person can be there treated with no greater risk of spreading the infection than would arise if he were removed to a place provided under regulation 8.

Examination of
railway travelers
at Perambur
and segregation
of plague cases.

12. At or near the railway station of Perambur any medical officer appointed either generally or specially by the President of the Municipality in this behalf may detain any train and may require any person travelling therein to alight and submit himself to medical examination as the medical officer may direct, either on the Railway premises or in some other suitable place which the President shall, if necessary, provide at the expense of the Municipal Fund; and if the said person is found to be suffering from or is suspected to be suffering from the bubonic plague, the medical officer may deal with him under the preceding regulation No. 11.

Ascertaining
particulars re-
garding travel-
lers.

Any such medical officer may also demand of any person so travelling his name, his usual abode and particulars of the places in which he has resided or which he has visited during the preceding fifteen days, and also the address to which he is about to proceed and any other particulars which the medical officer may think fit in view of satisfying himself as to the likelihood of the said person's spreading the infection of the plague. A person so interrogated shall be bound to answer truly to the best of his knowledge and belief all such questions and enquiries.

Detention of
persons from in-
fected districts
without fixed
place of resi-
dence.

If any such person is found to have within the preceding ten days been within a part of India believed by such medical officer to be infected by the plague and is unable to satisfy such officer that he is proceeding to any fixed place of residence, such officer may remove him or cause him to be removed to a place provided under regulation 8, and may there cause him to be detained for ten

days when, if he is certified free from the infection of the plague, he shall be permitted to depart therefrom.

13. Any person disobeying or contravening any of the foregoing regulations shall be deemed to have committed an offence punishable under section 188 of the Indian Penal Code and shall be liable on conviction to be punished with imprisonment of either description for a term which may extend to six months or with fine which may extend to one thousand rupees or with both.

No. 34. *Regulations for District Municipalities and Towns and Villagers.*

Whereas certain parts of India are visited by, and the Presidency of Madras is threatened with, an outbreak of a dangerous epidemic disease known as bubonic plague, and whereas the ordinary provisions of the law in force in the Presidency are insufficient for the purpose of preventing the outbreak or spread of the disease, His Excellency the Governor of Fort St. George in Council, in exercise of the powers delegated to him under section 2, sub-section (3) of the Epidemic Diseases Act, 1897, by the Governor-General in Council [Notification of the Government of India, Home Department, No. 302 (Sanitary), dated 4th February 1897], is pleased to prescribe, under the said Epidemic Diseases Act, the following temporary regulations to be observed in the District Municipalities constituted under the District Municipalities Act, 1894, and in other towns and villages in the Presidency :

Except Regulations Nos. 1, 8, 10, 11 and 13 which shall come into force at once, the following regulations shall take effect in any municipality, town or village from date on which the District Collector may apply the same, by notification in the district gazette, and to the extent to which he may determine:

1. In every District Municipality and every town or village, every house-holder and every medical practitioner practising therein who becomes cognisant of any case of the bubonic plague or of fever with glandular swellings in his house or in any other private dwelling within the limits of the Municipality, town or village, shall be bound to give information of the same with the least practicable delay, in the municipality to the Chairman of the Council and the medical officer in charge of the Municipal dispensary or hospital, and in a town or village not being a municipality to the officer in charge of the nearest police station who shall report at once to the Magistrate in charge of the division. The Chairman or Magistrate,

Preamble.

Date from which regulations take effect.

Report of cases by householders and medical practitioners.

as the case may be, shall forthwith send information to the Collector of the district of the occurrence of any such case.

**Establishment
and maintenance
of plague hos-
pitals.**

2. On the requisition of the Collector and to the extent to which he may determine, a Municipal Council or a District Board if it has not already made, the provision, shall provide and maintain in such localities, which in the case of a municipality may be within or without the municipal limits, as in the opinion of the District Medical and Sanitary Officer, or a Medical Officer deputed by him, may be proper for the purpose, suitable and sufficient accommodation to the satisfaction of such medical officer, for the isolation and treatment of persons suffering or suspected to be suffering from the plague, and also accommodation for their detention until they shall be certified by the Medical Officer in charge to be free from infection. In the places so provided the Municipal Council or District Board, as the case may be, shall furnish such hospital establishments, equipment and supplies as the District Collector may determine, and shall also make arrangements for feeding persons detained under the powers conferred by any of the regulations made under the Epidemic Diseases Act, 1897, on payment by them of the cost ; but in the case of indigent persons the Municipal Council or the District Board, as the case may be, shall supply them with food free of charge : provided that any person so detained may cater for himself subject to such rules and conditions as the medical officer in charge may prescribe. The Municipal Council or District Board, as the case may be, shall, on like requisition and in like manner and subject to like approval, provide accommodation for persons who may be required to vacate any building or ground under the regulation set out below numbered 4, 5 and 6 and who may be unable to procure necessary accommodation for themselves.

3. When in any building or place within a municipality, town or village there is a person suffering or suspected to be suffering from the bubonic plague, the Collector or any officer appointed by him generally or specially in this behalf may enter and either—

**Segregation of
plague patients
in hospital, in
their own houses
or in some other
suitable place.**

(a) remove him to one of the places of accommodation provided under the preceding regulation 2 and in such place or in some other place so provided to which at the discretion of the medical officer in charge he may from time to time be removed, there detain and treat him until he shall be certified by the said medical officer to be free from infection, or

(b) take measures for segregating and isolating the person in his own house or in some other suitable place, if in the

- opinion of the Medical Officer in charge the person can be there treated with no greater risk of spreading the infection than if he were removed to a place provided under the preceding regulation 2.

4. Any building or place which is required for, and is in the opinion of the District Medical and Sanitary Officer or the Medical Officer deputed by him in this behalf suitable for, the purpose of the accommodation to be provided under regulation 2 may be entered upon and occupied by the Municipal Council or the President of the District Board, as the case may be, or a person deputed by him in this behalf (untenanted without any notice whatsoever, and if tenanted after twenty-four hours' notice in writing conspicuously posted on such house or building) and may be used for the purposes of the accommodation under regulation 2 ; and the owner or the lessee of such building or place shall not be entitled to anything beyond a reasonable rent for the period during which the ground or building may remain in the occupation of the Municipal Council or the Collector and President of the District Board, as the case may be : provided that the Municipal Council or the Collector and President of the District Board, as the case may be, shall be bound at the cost of the Municipality or the District Board, as the case may be, thoroughly to cleanse and disinfect the ground or building and, if a building, to whitewash it internally and externally, before vacating it.

Occupation of buildings for plague hospitals.

5. When any building or place is, in the opinion of the Collector or an officer generally or specially authorised by him in writing in this behalf, so overcrowded as to make the inmates or occupiers specially liable to an attack of the bubonic plague, the Collector or officer authorised as aforesaid may, by a notice posted on some conspicuous part of the building or place, require the owner or occupier if actually residing in the building or place or the tenants or the actual occupants thereof to abate, as prescribed in the notice, the overcrowding within twenty-four hours by reducing the number of lodgers, tenants or other occupants of the said building or place, and, in default of compliance with the requisition in the said notice, may summarily eject all the inmates or occupants or reduce the number of the same in such manner and to such extent as may appear necessary ; and the owner or occupier or the tenants or the inmates of such building or place shall not be entitled to claim any compensation on account of such ejection.

Abatement of overcrowding.

6. When a building or place has, in the opinion of a medical officer appointed in this behalf, been so infected with the plague as to render its further occupation a source of danger to the inmates

Evacuation, cleansing and disinfection of infected buildings.

thereof, the Collector or an officer generally or specially authorised by him in writing in this behalf may summarily cause such building or place to be vacated and thoroughly cleansed and disinfected; and the building or place shall not be re-occupied until, in the opinion of such medical officer, it is safe to be re-occupied; and the owner or the occupier or the tenants or actual inmates or occupants thereof shall not be entitled to claim any compensation on account of anything done under this regulation.

Conveyance of
plague patients.

7. The Municipal Council or the Collector and President of the District Board, as the case may be, shall provide suitable conveyances for the free carriage to a place provided under regulation 2 of persons suffering, or suspected to be suffering, from the plague and for the transport of any clothing, bedding or other articles which have been exposed to infection.

Prohibition of
the use of infect-
ed water.

8. If it shall appear to the Collector or an officer deputed by him in this behalf that the water in any well, tank or other place is likely, if used for drinking, to engender or to cause the spread of the plague, he may by public notice prohibit the removal or use of the said water.

Destruction of
huts and sheds.

9. If the Collector of the district or an officer generally or specially authorised by him in writing in this behalf is of opinion that the destruction of any hut or shed is necessary to prevent the spread of the plague, the Collector or such officer as aforesaid may summarily take measures for the destruction of such hut or shed and the materials of which it is constructed; and the Chairman of the Municipal Council or the President of the District Board, as the case may be, may in his discretion grant compensation for any loss or damage caused by reason of such destruction out of the Municipal Fund constituted under Madras Act IV of 1884 or the Local Fund constituted under Madras Act V of 1884, as the case may be.

Plague patients
not to be carried
in public con-
veyances.

10. No owner, driver or person in charge of a public conveyance shall carry any person suffering from the plague; nor shall any person suffering from the disease enter a public conveyance.

Infected build-
ings not to be let
without previous
disinfection.

11. No person shall let a building or part of a building in which he knows, or has reason to know, that a person has been suffering from the plague, without having such building or part thereof, and every article therein likely to retain infection, disinfected to the satisfaction of the medical officer appointed by the Collector in this behalf.

Entry for exe-
cution of work
and abatement of
nuisances.

12. The Collector or an officer generally or specially authorised by him in writing in this behalf may, when he considers necessary, enter upon any premises, whether situated in a municipality or not, at any time during daylight and summarily execute any work required under, or summarily abate any of the nuisances described or indicated in,

sections 186, 220, 221 and 228 of the District Municipalities Act, 1884, or sections 99 and 101 of the Local Boards Act, 1884.

• 13. The Collector of the district may, in his discretion, order the disinfection or destruction of any collection of rags in rag-pickers' houses and rag-stores or of second-hand gunny-bags imported from any part of India infected by the plague and no person shall be entitled to claim compensation for any loss or damage sustained by reason of the disinfection or destruction of such articles under the powers conferred by this regulation.

14. At or near any railway station appointed by notification in the *Fort St. George Gazette* as an inspection station, any medical officer appointed in this behalf may detain any train and may require any person travelling therein to alight and submit himself to medical examination as the medical officer may direct, either on the railway premises or in some other suitable place which the Collector shall, if necessary, provide at the expense of the Municipal or Local Fund, as the case may be, and if the said person is suffering from, or suspected to be suffering from, the bubonic plague, the medical officer may deal with him under the preceding regulation 3.

Any such medical officer may also demand of any person so travelling his name, his usual abode and particulars of the places in which he has resided or which he has visited during the preceding fifteen days and also the address to which he is about to proceed and any other particulars which the medical officer may think fit in view of satisfying himself as to the likelihood of the said person's spreading the infection of the plague. A person so interrogated shall be bound to answer truly to the best of his knowledge and belief all such questions and enquiries. If any such person is found to have, within the preceding ten days, been within a part of India believed by such medical officer to be infected by the plague and is unable to satisfy such officer that he is proceeding to any fixed place of residence, such officer may remove him, or cause him to be removed, to a place provided under regulation 2 and may there cause him to be detained for ten days, when, if he is certified free from the infection of the plague, he shall be permitted to depart therefrom.

15. Any person disobeying or contravening any of the foregoing regulations shall be deemed to have committed an offence punishable under section 188 of the Indian Penal Code and shall be liable on conviction to be punished with imprisonment of either description for a term which may extend to six months or with fine which may extend to one thousand rupees or with both.

Passengers' tickets to be marked to indicate inspection having been performed.

16.* The inspecting medical officer at an inspection station notified under regulation 14 may require any passenger who may have been medically inspected to deliver up his ticket in order that some mark indicative of his having been inspected may be impressed thereon; and such passenger shall be bound to deliver it up accordingly.

Station master or ticket collector to require passengers to furnish particulars to the Police.

17. On a passenger's alighting at a railway station, which has not been appointed an inspection station under regulation 14, holding a ticket from a station which is within the limits prescribed in the margin and mentioned in Appendix A† to these regulations or which is within the Goa territory, the station master or ticket collector shall stop such passenger and require him to furnish to the police officer on duty at the station his name and address with particulars of the place whither he is bound, his business at such place, and the length or time he means to stay there; and the passenger shall be bound to furnish such information and answer all such enquiries truthfully to the best of his knowledge and belief. If there is no police officer at the railway station, the station master or ticket-collector shall himself record the said particulars.

Bombay to Sayn.	Karachi to Shikarpur and Pano Akil and all stations south of them to Dabheji
Bombay to Dhond.	vid both North-Western main line
Bombay to Manmad.	and Kotri-Rohri
Poona to Alandi.	chord. Hyderabad-Shadipalli Railway (Sind).

Particulars to be communicated to the authorities of the locality in which the passenger's destination is situated.

The police officer, station master or ticket-collector, as the case may be, shall thereupon communicate forthwith such information to the officer in charge of the nearest police station, who shall immediately communicate the same to the Divisional Magistrate, the District Medical and Sanitary Officer and the officer in charge of the police station within whose jurisdiction the place of the destination of the passenger is situated. The last mentioned officer shall inform the Municipal Chairman or the headman of the village, as the case may be, of the said place in view of the passengers being kept under observation.

Passengers alighting to evade inspection to be compelled to continue journey.

18. If a passenger from any railway station referred to in the last preceding regulation appears to be attempting to evade inspection at an inspection station by alighting at a station short of that for which his ticket has been taken, the station master or railway official in charge shall insist on his continuing his journey as far as the inspection station either by the same or the next following train and may, with the assistance of the police, take all such steps as may be necessary to compel him to do so.

* Rules 16 to 20 issued in Notification No. 18, dated the 6th April 1897.

† Not printed.

19. Any such passenger alighting at a railway station short of an inspection station, who from his being unable to show any business at the place of alighting appears to have so alighted for the purpose of evading examination at such inspection station, may be detained by the station master at the railway station at which he has alighted and be forwarded by the same or the next train to the inspection station. The railway fare of the person so detained and forwarded to the inspection station shall be paid by the passenger and, if not paid, shall be recovered from him by the railway authorities as excess fare.

Such passengers may be detained and forwarded by another train.

20. When any through carriage from the Bombay Presidency is detached from a train at any railway station in Madras Presidency, it shall be disinfected or ventilated in the following manner as soon as possible and before it is again brought into use:—

Through carriages from the Bombay Presidency to be disinfected on being detached.

Third and intermediate class carriages—

The interior wood-work of the carriages, especially the floors and seats, shall be thoroughly washed with a solution of perchloride of mercury (1 in 1,000) or with a carbolic acid solution (a wine-glassful to a gallon); the doors and windows shall be opened, and the vehicle exposed to the air.

First and second class carriages—

The floors and wood-work shall be treated as above, the cushions being also brushed and thoroughly cleaned.

21.* The clothing, bedding and personal effects of all persons detained or segregated under regulation 3 or removed under regulation 14 to a place provided under regulation 2 shall be thoroughly disinfected and may, at the discretion of the medical officer in charge of the place of detention or segregation, be destroyed.

Destruction or disinfection of infected clothing or bedding.

The Collector of the district may in his discretion, at the cost of Local or Municipal funds, award compensation for articles destroyed, but no person shall be entitled as of right to recover any compensation by way of damages or otherwise for the destruction or disinfection of any article dealt with as above.

Payment of compensation.

Where the clothes or bedding of a traveller shall have been destroyed as hereinbefore provided, the medical officer may, if the person is poor, arrange for providing other necessary articles in their place, the cost of the same being intimated to the Collector of the district who shall debit it to Local or Municipal funds at his discretion.

Provision of new articles.

* Rule 21 issued in Notification No. 19, dated the 12th April 1897.

Regulations issued by the Government of Bengal.**GENERAL REGULATIONS ISSUED BEFORE THE PASSING
OF THE EPIDEMIC DISEASES ACT.**

Instructions to
the Corporation
of Calcutta.

Resolution No. 937-T.—M., dated the 10th October 1896.

No. 35.

In the Government letter* No. 770-T.—M. of the 30th September, a copy of which is annexed to this Resolution, the Corporation of Calcutta were addressed on the subject of the reported outbreak of plague in Bombay, and it was suggested that the following measures should be taken under sections 321 to 334 of the Calcutta Municipal Act:—

- (1) To declare bubonic plague or any form of typhus fever with glandular swellings to be a dangerous disease regarding any case of which information should at once be communicated to the Commissioners or their Health Officer under section 321.
- (2) To select a site for a temporary plague hospital away from the main thoroughfares, and to arrange for its prompt erection should the need arise.
- (3) To provide special carts for the conveyance of cases to hospital, and to arrange for the disinfection of both carts and drivers.
- (4) To divide the town into sanitary circles of manageable size, and to place in charge of each a medical inspector with full powers to carry out the measures ordered by the Commissioners or Government for preventing the spread of the disease.
- (5) To draw up regulations under section 334 of the Act, in order to give effect to such special measures as might be necessary to prevent, check or mitigate an outbreak of plague.

The Corporation were further informed that the Government would be prepared to appoint a Medical Board to assist the Corporation in devising measures to deal with the disease.

Instructions to
the Magistrate of
Howrah.

2. While trusting that no necessity for the above measures would arise, the Lieutenant-Governor expressed his entire approval of the steps taken under the Commissioners' orders to give special attention

to the cleansing and sanitation of Calcutta. A copy of the letter was sent to the Commissioner of Burdwan, who was directed to instruct the Magistrate of Howrah to move the Municipality to take the necessary action to cleanse and sanitize the town.

3. A case of mild bubonic plague is now reported to have occurred in Howrah, the patient being a Eurasian lad of 17, who arrived from Bombay on the 26th September, and is believed (though this is not certain) to have brought the disease with him. It may be hoped that the case is an isolated one, and that no general outbreak of the disease will take place. But the occurrence of even a single case in a crowded area where the sanitary conditions are such as to favour the spread of contagion, if not actually to generate the disease, convinces the Lieutenant-Governor that the time has now come to adopt further preventive measures.

4. It has accordingly been decided to appoint the following gentlemen to form a Medical Board for the purpose of determining the action to be taken by all executive authorities, whether official or municipal, with the object of preventing and checking the plague throughout Bengal:—

Hon'ble H. H. Risley, C.I.E., Secretary to Government, Financial and Municipal Departments. } *President.*

Hon'ble P. Playfair, C.I.E.
Hon'ble J. G. H. Glass, C.I.E., Chief Engineer.
Surgeon-Colonel Ross, Inspector-General of Civil Hospitals.
Surgeon-Captain Dyson, Sanitary Commissioner.
Dr. Mahendra Lal Sirkar, C.I.E. } *Members.*

Surgeon-Captain Robson-Scott, Officiating Deputy Sanitary Commissioner,
Presidency Circle *Secretary.*

5. All cases of illness which are believed to be plague should at once be reported to the Board by the Magistrate of the district where they occur, and in Calcutta by the Health Officer of the Corporation. The orders issued by the Board on matters affecting health and conservancy should be deemed to be the orders of Government and carried out with all possible despatch by all executive authorities. Steps will hereafter be taken, if necessary, to legalise all action taken during the present emergency. Nothing should meantime prevent the Board from ordering, or the executive authorities from carrying out, any reasonable measure of precaution, segregation or disinfection which may appear called for,

Areas to be dealt with in the first instance by the Board.

6. The areas which the Board will have in the first instance to deal with in order to arrest the spread of the plague are the following :—

- (1) The Town of Calcutta.
- (2) The Port of Calcutta.
- (3) The Municipality of Howrah.
- (4) The small Municipalities adjacent to Calcutta and Howrah.
- (5) The lines of railway.

Sanitary and precautionary measures in Calcutta.

7. *The Town of Calcutta.*—The plague has already been declared to be a dangerous disease under section 321 of the Municipal Act, and it is further understood that the measures indicated in the Government letter of 30th September have already been adopted, or are in course of adoption, by the Corporation. The Commissioners have asked the Government to select for them a Chief Superintendent to organise and control the conservancy and nuisance branch of the Health Department for three months on a salary of Rs. 1,000 a month. Dr. Banks, Civil Medical Officer of Puri, who possesses in a high degree the requisite qualifications, has been appointed to the post, and directed by telegram to join at once. Sites have been selected in Manikṭola for an isolation hospital and a special burning-ghāt and burial-ground for plague patients. The town is being divided by the Health Officer into sanitary circles, and regulations under section 334 of the Act are about to be submitted for the sanction of Government. The Lieutenant-Governor feels sure that the Commissioners, the Executive Officers of the Corporation, and their subordinates will work cordially with the Medical Board and carry out promptly and fully all the recommendations of that body.

Sanitary and precautionary measures at Howrah.

8. *The Municipality of Howrah.*—The Chairman of the Municipality has been instructed by telegram to isolate the patient now suffering from the plague, to destroy his clothes, and to disinfect the house in which he has been living. The Municipality have asked by telegram for the appointment of an officer of the rank of Surgeon-Captain as Health Officer of the town on a salary of Rs. 1,500 a month and carriage allowance; but the Lieutenant-Governor considers that the needs of Howrah can best be met by transferring the present Civil Surgeon, who is in weak health, to a lighter station, and deputing a younger officer, Surgeon-Major Walsh, to carry on the combined duties of Civil Surgeon and of Health Officer with the assistance of an experienced supervisor of the Public Works Department, who will receive Rs. 500 a month with horse allowance and house rent. The Deputy Sanitary Commissioner of the Western Circle was ordered

to Howrah to assist in sanitary measures two days before the case of plague was reported to Government.

9. *The adjacent Municipalities.*—The Chairmen of the Municipalities noted in the margin should now report to the Medical Board, through the Magistrate of the district, what steps they propose to take to prevent the plague spreading to their jurisdictions. The Deputy Sanitary Commissioners will be directed to visit these Municipalities as soon as possible, and to explain to the Chairmen personally what ought to be done.

Hooghly-Chinsurah ... }	In Hooghly district.
Serampur	
Uttarpara	
Baidyhati	
Bhadreswar	
Kotrang	In Howrah district.
Bansberia	
Bally	
Cossipur-Chitpur ... }	In the 24-Parganas.
Manikola ...	
Baranagar ...	
South Suburban	
South Dum-Dum	
North Dum-Dum	
South Barrackpore	
North Barrackpore	
Baraset ... }	
Naihati ... }	

Suburban Municipalities.

10. *The Port of Calcutta.*—The Government of India have been moved by telegram to sanction the introduction, with such modifications as may be necessary, of the revised rules for quarantine against plague which were introduced in August 1894 for the protection of Calcutta from the importation of plague from Hong-kong. It has also been suggested that under section 19 of the Sea Customs Act the export of rags and second-hand clothing from Bombay should be prohibited. Steps are being taken to provide accommodation for plague patients near the quarantine anchorage at Diamond Harbour, and all suspected vessels will be carefully examined and disinfected by the Port Health Officer before communication with the shore is permitted.

Quarantine arrangement at the Port.

11. *The lines of railway.*—Under section 71 of the Railway Act IX of 1890, a railway administration may refuse to carry persons suffering from any infectious or contagious disease, and under section 117 any such person may be removed by a railway servant from the carriage in which he is travelling. On the 1st October, the Governor of Bombay was asked by telegram whether, in event of the disease increasing, he would be prepared to move the Railway Company to prevent suspected persons from leaving Bombay by rail; and on the next day, His Excellency replied that the Municipal and Railway authorities were in consultation, and that if the disease increased, the necessary measures would be taken. The East Indian Railway have already posted native doctors at Asansol, Allahabad, and Tundla to scrutinise all passengers, especially those coming from Bombay, while tickets are being checked. The Assistant Superintendent of Emigration at Raniganj and Asansol has been instructed to give

Inspection on the railways.

all possible assistance to the railway officials in the matter. The Government of the North-Western Provinces and Oudh, and the Administration of the Central Provinces, have also been addressed on the subject.

APPOINTMENT OF A MEDICAL BOARD TO DIRECT OPERATIONS.

Plague Notification No. 1, dated the 10th February 1897. No. 36.

In exercise of the powers conferred by sub-section (1) of section 2 of the Epidemic Diseases Act, 1897, and by the Notification of the Government of India in the Home Department, No. 302, dated the 4th instant, the Lieutenant-Governor of Bengal is pleased—

The Special
Medical Board
charged with the
conduct of the
operations.

(a) to charge the Medical Board appointed by the Government Resolution No. 937-T.—M., dated the 10th October 1896, with the duty of preventing the outbreak and checking the spread of bubonic plague within the territories, subject to the administration of the Lieutenant-Governor of Bengal;

Municipalities
to carry into
effect measures
ordered by the
Board.

(b) to direct that every body of Municipal Commissioners, and their officers and servants, shall carry into effect, without delay, any measures which may be ordered by the Medical Board for preventing the outbreak or spread of bubonic plague within the area, subject to the authority of such Commissioners; and

Incidence of
cost.

(c) to declare that the cost of all such measures shall be a charge on the Municipal Fund; save in so far as it may, in accordance with law, be recoverable from the owners or occupiers of property.

REGULATIONS FOR THE INSPECTION OF TRAVELLERS BY RAILWAY AND STEAMER.

Plague Notification No. 2, dated the 10th February 1897. No. 37.

Preamble.

In exercise of the powers conferred by section 2 of the Epidemic Diseases Act, 1897, and by the Notification of the Government of India, Home Department, No. 302, dated the 4th instant, the Lieutenant-Governor is pleased to prescribe the following regulations for the inspection of persons travelling by railway or steamer within the territories subject to the Lieutenant-Governor of Bengal, and the

segregation in hospital or in temporary accommodation of persons suspected of being infected with bubonic plague:—

1. In these regulations—

- (a) "Inspecting Officer" means a medical officer appointed by the Lieutenant-Governor to inspect travellers, and empowered to inspect and order the segregation of persons suspected of being infected with plague. Definitions.
- (b) "Place of Inspection" means the railway stations or steamer ghâts at which the Lieutenant-Governor has ordered travellers to be inspected, and includes the area round such stations or ghâts, subject to the control of the Railway Administration or Steamer company, as the case may be.
- (c) "Railway servant" means any person employed by a Railway Administration in connection with service of a railway.
- (d) "Steamer servant" means any person employed by a steamer company in connection with the service of a steamer.
- (e) "Hospital" and "temporary accommodation," respectively, mean a hospital and a place of temporary accommodation provided by a Railway Administration or steamer company under Regulation 9.

2. Persons travelling by railway in the direction of Calcutta shall be inspected at the station of Khana on the East Indian Railway and at the station of Katihar on the Eastern Bengal State Railway. Inspection stations at Khana and Katihar.

3. Persons travelling by steamer down the Ganges from the direction of the North-Western Provinces shall be inspected at Damukdia. At Damukdia.

4. Persons suspected by the inspecting officer of being infected with plague shall be required by him to undergo segregation in hospital or in temporary accommodation for a period of not less than seven days, which may be reduced at the discretion of the inspecting officer. Segregation.

5. All persons travelling by railway or steamer aforesaid who are required by the inspecting officer or by a railway servant or steamer servant or police officer to submit themselves to medical inspection shall comply with the instructions given to them, and shall not leave the place of inspection without the permission of the inspecting officer. Travellers to obey instructions.

6. All such persons who are required by the inspecting officer to undergo segregation in hospital or in temporary accommodation shall comply with the instructions given to them, and shall not leave the said hospital or accommodation without the permission of the inspecting officer. Segregated persons to obey instructions.

Females.

7. In conducting the medical inspection of females, and in arranging for their segregation, the inspecting officer shall as far as possible have regard to the customs of the country.

Destruction and disinfection of suspicious articles.

8. The inspecting officer may disinfect, or, in his discretion, cause to be destroyed, any article which he considers liable to convey infection, and the owner of any article so destroyed shall be entitled to receive such compensation as the District Magistrate considers adequate.

9. At places of inspection it shall be the duty of the Railway Administration or steamer company—

Duties of railway administrations.

- (a) to carry out the orders of the inspecting officer as to the manner in which passengers are to be inspected;
- (b) to make provision for the segregation of suspected persons in hospital and temporary accommodation in accordance, so far as may be, with standard plans approved by the Sanitary Commissioner;
- (c) to prevent persons from leaving such hospital or accommodation without the permission of the inspecting officer;
- (d) to make provision to the satisfaction of the inspecting officer for the supply of food and water to persons undergoing segregation, and for the proper sanitation of the place where they are detained; and
- (e) generally to carry out the orders of the inspecting officer in respect of the above matters.

Erection of hospital and temporary accommodation.

10. It shall be lawful for the Railway Administration or steamer company to enter upon and occupy any waste or arable land required for the purpose of hospitals or temporary accommodation on payment to the owner, lessee or occupier of such reasonable sum as compensation for damage done and by way of rent as the Collector of the district may assess on that account.

Duties of Police.

11. All officers of the District and Railway Police are required to assist the inspecting officer in enforcing these regulations.

GENERAL REGULATIONS FOR THE CITY OF CALCUTTA.

Plague Notification No. 4, dated the 10th February 1897.

No. 38.

Preamble.

In exercise of the powers conferred by sub-section (1) of section 2 of the Epidemic Diseases Act, 1897, and by the Notification of the Government of India in the Home Department, No. 302, dated the 4th instant, the Lieutenant-Governor is pleased to prescribe the

following regulations for preventing the spread of the bubonic plague in Calcutta :—

1. These regulations shall come into force from the date on which the plague may be declared by the Medical Board to be prevalent in Calcutta, and they shall remain in operation until the Board declare the plague to have ceased in the town. When the rules are to be enforced.

2. In these regulations "Health Officer" means the Health Officer of Calcutta, and includes an Assistant Health Officer and the Chief Superintendent of Conservancy. Health Officer.

3. Every male householder who becomes cognisant of any case of the bubonic plague or of fever with glandular swellings in his house shall give information of the same to the Ward Office with the least practicable delay. Report by householders.

4. The Health Officer may at any time, between sunrise and sunset, after giving such notice of his intention as shall, under the circumstances, appear to him to be reasonable, enter upon any premises and summarily cause to be cleansed the whole or any portion of them in such manner as may appear to him necessary, provided that when an apartment is occupied by a female who, according to the custom of the country, does not appear in public, the Health Officer shall give at least one hour's notice of his intention to enter such apartment, and shall afford her every reasonable facility for withdrawing from such portion of the apartment as he may desire to enter. Entry into and cleansing of houses.

5. When a dwelling is so overcrowded or in such an insanitary state as, in the opinion of the Health Officer, to make the inmates thereof specially liable to an attack of the bubonic plague, the Chairman may, by a notice posted on some conspicuous part of the dwelling, require the owner or the occupier, if actually residing in the dwelling, or the tenants or the actual inmates thereof, to abate the overcrowding within 24 hours by reducing the number of lodgers, tenants or other inmates of the said dwelling as prescribed in the notice, or to vacate the dwelling. In default of compliance with the requisition in the said notice, the Chairman may summarily eject all the inmates, or reduce the number of inmates in such manner and to such extent as may appear necessary. The Chairman shall provide the inmates so ejected, when necessary, with temporary accommodation. Overcrowded and insanitary dwellings.

6. When a case of plague occurs in any premises, the Chairman may, after giving reasonable notice, summarily cause such premises to be vacated and thoroughly cleansed and disinfected in such manner as may appear to him necessary, and may cause all articles which, in the opinion of the Health Officer, cannot be properly disinfected, to Treatment of houses in which plague cases occur.

be destroyed. He may also, in consultation with the Engineer of the Corporation, cause to be removed all partitions, erections or portions of house walls which impede or obstruct ventilation. The premises shall not be re-occupied without the written permission of the Chairman. The Chairman shall provide the inmates thereof, when necessary, with temporary accommodation.

Destruction of huts and sheds.

7. If, in the opinion of the Health Officer, the destruction of any hut or shed is necessary to prevent the spread of the disease, the Chairman may, after giving reasonable notice, cause such hut or shed, and the materials of which it is constructed, to be dismantled and destroyed by fire or otherwise.

Rags.

8. No person, except the servants of the Corporation, shall pick up rags or other refuse in the streets or elsewhere; nor shall rags or other refuse be transported, except under such conditions as may be prescribed by the Health Officer. Any person picking up rags or other refuse in the streets or elsewhere shall be liable to be arrested by the police. The Chairman may disinfect or, at his discretion, cause to be destroyed any collection of rags in rag-pickers' houses or rag-stores.

Provision of hospital accommodation.

9. It shall be lawful for the Chairman to select a site and erect a hospital thereon, or to convert any house or other building into a hospital, for the isolation of patients suffering from the plague, in any locality which, in the opinion of the Health Officer, may be suitable for the purpose. In such hospital separate and suitable accommodation shall be provided for females, having regard to their rank and station in life.

Provision of segregation accommodation.

10. It shall be lawful for the Chairman to select a site and erect thereon temporary accommodation, or to convert any building, not being a place of worship, into accommodation, for the segregation of persons suspected to be infected with plague, or for the residence of persons compelled to vacate their houses under these regulations. The owner or lessee of such site or building shall not be entitled to claim from the Chairman anything beyond a reasonable rent for the period during which the site or building may remain in his occupation. Before vacating the building the Chairman shall cause it to be thoroughly cleansed and disinfected both internally and externally.

Conveyance of plague patients.

11. The Chairman shall provide suitable conveyances, painted in a conspicuous manner, for the free carriage of persons suffering, or suspected to be suffering, from the plague, and for the free transport of any clothing, bedding or other articles which have been exposed to infection; and it shall be lawful to drive or carry such conveyances through any public or private thoroughfare.

12. When in any dwelling there is a patient suffering, or suspected to be suffering, from the plague, the Health Officer may enter that dwelling at any time of the day or night, after giving such notice of his intention as shall, under the circumstances, appear to him to be reasonable, and may take measures for segregating and isolating the patient within, or in a temporary structure attached or adjacent to, such dwelling. When the patient is a female who, by the custom of the country, does not appear in public, the Health Officer shall, if possible, depute a female doctor to examine her. When patients, of whatever sex or age, cannot be properly isolated at or in the immediate vicinity of their own houses, the Chairman may cause them to be removed to hospital. In the case of a female who, by the custom of the country, does not appear in public, all possible effort shall be made to preserve her *purda* : Segregation of patients.

— Provided that when the Medical Board is satisfied that suitable and sufficient accommodation for the complete segregation of infected and suspected persons and efficient medical attendance have been provided by an association of families, it may exempt such families from the provisions of this regulation. This exemption may be withdrawn if the Health Officer reports that medical attendance and segregation are not maintained to his satisfaction. Proviso.

13. The Chairman may provide and set apart special burial-grounds and cremation-grounds for plague patients, and it shall be unlawful to burn or bury the corpse of a plague patient in any other cremation or burial ground. Burial and cremation grounds.

14. The Chairman may, from time to time, by public notice, prescribe the manner in which the corpses of plague patients are to be conveyed to burning or burial grounds. Disposal of corpses.

15. The Chairman may, in his discretion, pay compensation to any person who has sustained substantial loss or damage by reason of anything done under the powers conferred by these regulations : provided, however, that no person shall be entitled as of right to claim any compensation whatsoever. Compensation.

16. All expenses incurred in carrying out these regulations shall in the first instance be paid from the Municipal Fund, but the Chairman may recover from any person any amount which such person would under similar circumstances be liable to pay to the Commissioners under the Calcutta Municipal Consolidation Act, 1888. Incidence of expenditure.

17. On the requisition of the Chairman, the Commissioner of Police shall give such assistance as may be necessary in order to enforce immediate compliance with any of the foregoing regulations. Commissioner of Police.

GENERAL REGULATIONS FOR MUNICIPAL TOWNS OTHER THAN CALCUTTA.

Plague Notification No. 5, dated the 10th February 1897.

No. 39.

Preamble.

In exercise of the powers conferred by sub-section (1) of section 2 of the Epidemic Diseases Act, 1897, and by the Notification of the Government of India in the Home Department, No. 302, dated the 4th instant, the Lieutenant-Governor is pleased to prescribe the following regulations for preventing the spread of the bubonic plague in municipal towns in Bengal other than Calcutta :—

**When the rules
are to be
enforced.**

1. These regulations shall come into force from the date on which the plague may be declared by the Medical Board to be prevalent in any town, and they shall remain in operation until the Board declare the plague to have ceased in that town.

Health Officer.

2. In these rules "Health Officer" means the Civil Surgeon, and includes a Civil Medical Officer and an Assistant Surgeon in medical charge.

**Report by
householders**

3. Every male householder who becomes cognisant of any case of the bubonic plague or of fever with glandular swellings in his house shall give information of the same to the Health Officer with the least practicable delay.

**Entering into and
cleansing of
houses.**

4. The Health Officer may at any time, between sunrise and sunset, after giving such notice of his intention as shall, under the circumstances, appear to him to be reasonable, enter upon any premises and summarily cleanse the whole or any portion of them in such manner as may appear to him necessary : provided that when an apartment is occupied by a female who, according to the custom of the country, does not appear in public, the Health Officer shall give at least one hour's notice of his intention to enter such apartment, and shall afford her every reasonable facility for withdrawing from such portion of the apartment as he may desire to enter.

**Overcrowded and
insanitary
dwellings.**

5. When a dwelling is so overcrowded or in such an insanitary state as, in the opinion of the Health Officer, to make the inmates thereof specially liable to an attack of the bubonic plague, the Magistrate of the District may, by a notice posted on some conspicuous part of the dwelling, require the owner or the occupier, if actually residing in the dwelling, or the tenants or the actual inmates thereof, to abate the overcrowding within 24 hours by reducing the number of lodgers, tenants or other inmates of the said dwelling as prescribed in the notice, or to vacate the dwelling. In default of compliance with the requisition in the said notice, the Magistrate may summarily eject all the inmates, or reduce the number of inmates in such manner and to such extent as may appear necessary. The Magistrate shall

provide the inmates so ejected, when necessary, with temporary accommodation.

6. When a case of plague occurs in any premises, the Magistrate of the District may, after giving reasonable notice, summarily cause such premises to be vacated and thoroughly cleansed and disinfected; and may cause all articles which, in the opinion of the Health Officer, cannot be properly disinfected to be destroyed. He may also, in consultation with the District Engineer, cause to be removed all partitions, erections, or portions of house walls which impede or obstruct ventilation. The premises shall not be re-occupied without the written permission of the Health Officer. The Magistrate shall provide the inmates thereof, when necessary, with temporary accommodation.

Treatment of houses in which plague cases occur.

7. If, in the opinion of the Health Officer, the destruction of any hut or shed is necessary to prevent the spread of the disease, the Magistrate of the District may, after giving reasonable notice, cause such house, hut or shed, and the materials of which it is constructed, to be dismantled and destroyed by fire or otherwise.

Destruction of huts and sheds.

8. No person, except municipal servants, shall pick up rags or other refuse in the streets or elsewhere; nor shall rags or refuse be transported, except under such conditions as may be prescribed by the Health Officer. Any person picking up rags or other refuse in the streets or elsewhere shall be liable to be arrested by the police. The Magistrate of the District may disinfect or, at his discretion, destroy any collection of rags in rag-pickers' houses or rag-stores.

Rags.

9. It shall be lawful for the Magistrate of the District to select a site and erect a hospital thereon, or to convert any house or other building into a hospital, for the isolation of patients suffering from the plague, in any locality which, in the opinion of the Health Officer, may be suitable for the purpose. In such hospital separate and suitable accommodation shall be provided for females, having regard to their rank and station in life.

Provision of hospital accommodation.

10. It shall be lawful for the Magistrate to select a site and erect thereon temporary accommodation, or to convert any building, not being a place of worship, into accommodation, for the segregation of persons suspected to be infected with plague, or for the residence of persons compelled to vacate their houses under these regulations. The owner or lessee of such site or building shall not be entitled to claim from the Magistrate anything beyond a reasonable rent for the period during which the site or building may remain in his occupation. Before vacating the building the Magistrate shall cause it to be thoroughly cleansed and disinfected both internally and externally.

Provision of segregation accommodation.

11. The Magistrate shall provide suitable conveyances, painted in a conspicuous manner, for the free carriage of persons suffering, plague patients.

Conveyance of plague patients.

or suspected to be suffering, from the plague, and for the free transport of any clothing, bedding or other articles which have been exposed to infection ; and it shall be lawful to drive or carry such conveyances through any public or private thoroughfare.

Segregation of patients.

12. When in any dwelling there is a patient suffering, or suspected to be suffering, from the plague, the Health Officer may enter that dwelling at any time of the day or night, after giving such notice of his intention as shall, under the circumstances, appear to him to be reasonable, and may take measures for segregating and isolating the patient within, or in a temporary structure attached or adjacent to, such dwelling. When the patient is a female who, by the custom of the country, does not appear in public, the Health Officer shall, if possible, depute a female doctor to examine her. When patients, of whatever sex or age, cannot be properly isolated at or in the immediate vicinity of their own houses, the Magistrate of the District may cause them to be removed to hospital. In the case of a female who, by the custom of the country, does not appear in public, all possible effort shall be made to preserve her *purda* :

Proviso.

Provided that when the Magistrate of the District is satisfied that suitable and sufficient accommodation for the complete segregation of infected and suspected persons and efficient medical attendance have been provided by an association of families, he may exempt such families from the provisions of this regulation. This exemption may be withdrawn if the Health Officer reports that medical attendance and segregation are not maintained to his satisfaction.

Burial and cremation grounds.

13. The Magistrate may provide and set apart special burial-grounds and cremation-grounds for plague patients, and it shall be unlawful to burn or bury the corpse of a plague patient in any other cremation or burial ground.

Disposal of corpses.

14. The Magistrate may, from time to time, by public notice, prescribe the manner in which the corpses of plague patients are to be conveyed to burning or burial grounds.

Compensation.

15. The Magistrate may, in his discretion, pay compensation to any person who has sustained substantial loss or damage by reason of anything done under the powers conferred by these regulations : provided, however, that no person shall be entitled as of right to claim any compensation whatsoever.

Incidence of expenditure.

16. All expenses incurred in carrying out these regulations shall, in the first instance, be paid from the Municipal Fund, but the Magistrate may recover from any person any amount which such person would under similar circumstances be liable to pay to the Commissioners under the Bengal Municipal Act, 1884.

FURTHER REGULATIONS FOR MUNICIPAL TOWNS AND VILLAGES.

No. 40. Plague Notification No. 6, dated the 12th March 1897.

In exercise of the powers conferred by sub-section (1) of section Preamble. 2 of the Epidemic Diseases Act, 1897, and by the Notification of the Government of India in Home Department, No. 302, dated the 4th February 1897, the Lieutenant-Governor is pleased to prescribe the following regulations for preventing the spread of the bubonic plague in villages and in municipal towns in which the regulations prescribed by Plague Notification No. 5 have not yet come into force :—

1. In these regulations "Health Officer" means the Civil Surgeon Health Officer. of the district, and includes a Civil Medical Officer and an Assistant Surgeon in medical charge.

2. If, on examination of a sick person in any town or village, the Health Officer suspects that such person is suffering from or infected with plague, he may cause such person to be removed to a temporary hospital or isolation shed, and may arrange for his detention, dieting and medical treatment therein. He may also cause the other occupants of the house in which such person resides to be removed to segregation huts, tents or other suitable places, and to be detained under observation for seven days. Segregation of suspected cases and other inmates of the house.

3. All persons referred to in regulation 2 shall comply with the instructions given to them by the Health Officer, and shall not leave the place appointed by him for their detention without his written permission. Persons segregated to obey instructions.

4. Any masonry house occupied by persons detained under regulation 2 shall be thoroughly cleansed and disinfected and shall not be re-occupied without the written permission of the Health Officer. Evacuation and disinfection of houses.

5. If, in the opinion of the Health Officer, the destruction of any hut or shed is necessary to prevent the spread of the disease, the District Magistrate may, after giving reasonable notice, cause such hut or shed and the materials of which it is composed to be dismantled and destroyed by fire. Destruction of huts and sheds.

6. The clothing, bedding and personal effects of all persons detained under regulation 2 shall be thoroughly disinfected, and may, at the discretion of the Health Officer, be destroyed by fire. Destruction or disinfection of infected clothing, bedding, etc.

7. In the event of death occurring from plague, the Health Officer shall arrange for the disposal of the body. In the case of a European or Muhammadan, the body shall be buried at least six feet deep and be covered with quicklime. The place of burial, if not an authorised cemetery, should be well away from habitations and sources of water-supply. In the case of a Hindu, the body shall be thoroughly and Disposal of corpses.

completely burned in an isolated locality in the presence of a responsible official. The clothing, bedding and all personal effects of the deceased that are liable, in the opinion of the Health Officer, to carry infection shall be destroyed by fire.

Disinfection of conveyances.

8. Any conveyance, public or private, that has been used by a person infected with, or suspected of being infected with, plague shall be thoroughly disinfected and exposed to air and sunlight for seven days before being again used, and all articles of furniture belonging to it which, in the opinion of the Health Officer, cannot be properly disinfected, shall be destroyed by fire.

Compensation.

9. The District Magistrate may, in his discretion, pay compensation to any person who has sustained substantial loss or damage by reason of anything done under these regulations: provided, however, that no person shall be entitled as of right to claim any compensation whatsoever.

Police.

10. All Police Officers shall give to the Health Officer such assistance as he may consider necessary in carrying out these regulations.

FURTHER REGULATIONS FOR THE CITY OF CALCUTTA.

Plague Notification No. 7, dated the 12th March 1897.

No. 42.

Preamble.

In exercise of the powers conferred by sub-section (1) of section 2 of the Epidemic Diseases Act, 1897, and by the Notification of the Government of India in the Home Department, No. 302, dated the 4th February 1897, the Lieutenant-Governor is pleased to prescribe the following regulations for preventing the spread of the bubonic plague in Calcutta until the regulations prescribed by Plague Notification No. 4 come into force:—

Health Officer.

1. In these regulations Health Officer means the Health Officer of Calcutta, and includes an Assistant Health Officer and a Chief Superintendent of Conservancy.

Report by Medical Practitioners and Police Officers.

2. Every medical practitioner and every police officer or municipal servant who becomes cognizant of a case of plague shall report the fact to the Health Officer.

Segregation of suspected cases and other inmates of the house.

3. If, on examination of a sick person, the Health Officer suspects that such person is suffering from or infected with plague, he may cause such person to be removed to a temporary hospital or isolation shed, and may arrange for his detention, dieting and medical treatment therein. He may also cause the other occupants of the house in which such person resides to be removed to segregation huts, tents or other suitable places, and to be detained under observation for seven days,

4. All persons referred to in regulation 3, and all persons who may be removed to a hospital under the control of the Health Officer by order of the military medical authorities at Calcutta or of the Port Health Officer, shall comply with the instructions given to them by the Health Officer, and shall not leave the place appointed by him for their detention without his written permission. Persons segregated to obey instructions.

5. Any masonry house occupied by persons detained under regulation 3 shall be thoroughly cleansed and disinfected, and shall not be re-occupied without the written permission of the Health Officer. Cleansing and disinfection of masonry houses.

6. If, in the opinion of the Health Officer, the destruction of any hut or shed is necessary to prevent the spread of the disease, the Chairman may, after giving reasonable notice, cause such hut or shed and the materials of which it is composed to be dismantled and destroyed by fire. Destruction of huts and sheds.

7. The clothing, bedding and personal effects of all persons detained under regulation 3 shall be thoroughly disinfected, and may, at the discretion of the Health Officer, be destroyed by fire. Disinfection and destruction of infected clothing, bedding, etc.

8. In the event of death occurring from plague, the Health Officer shall arrange for the disposal of the body. In the case of a European or Muhammadan, the body shall be buried at least six feet deep and be covered with quicklime. The place of burial, if not an authorised cemetery, should be well away from habitations and sources of water-supply. In the case of a Hindu, the body shall be thoroughly and completely burned in an isolated locality in the presence of a responsible official. The clothing, bedding and all personal effects of deceased that are liable, in the opinion of the Health Officer, to carry infection shall be destroyed by fire. Disposal of corpses.

9. Any conveyance, public or private, that has been used by a person infected with, or suspected of being infected with, plague shall be thoroughly disinfected and exposed to air and sunlight for seven days before being again used, and all articles of furniture belonging to it which, in the opinion of the Health Officer, cannot be properly disinfected, shall be destroyed by fire. Disinfection of infected conveyances.

10. The Chairman may, in his discretion, pay compensation to any person who has sustained substantial loss or damage by reason of anything done under these regulations: provided, however, that no person shall be entitled as of right to claim any compensation whatsoever. Compensation.

11. On the requisition of the Chairman, the Commissioner of Police shall give such assistance as may be necessary in order to enforce immediate compliance with any of the foregoing regulations. Commissioner of Police.

REVISED GENERAL PLAGUE REGULATIONS FOR BENGAL.

Plague Notification No. 9, dated 10th November 1887.

No. 42.

In exercise of the powers conferred by sub-section (1) of section 2 of the Epidemic Diseases Act, 1897, and by the Notification of the Government of India in the Home Department, No. 302, dated 4th February 1897, the Lieutenant-Governor of Bengal is pleased to prescribe the following Regulation for preventing the spread of the bubonic plague, in supersession of the Regulations prescribed by Plague Notifications Nos. 1, 4 and 5, dated the 10th February, and Nos. 6 and 7, dated the 12th March:—

Part I.—Appointment of Plague Commission.

1. The following gentlemen are appointed to form a Plague Commission for the purpose of advising the Government, the district and railway officials, heads of departments, Municipalities and District Boards, as to the measures to be taken in order to prevent the outbreak and check the spread of bubonic plague within the territories subject to the administration of the Lieutenant-Governor of Bengal, and of discharging such further duties as may hereafter be assigned to them:—

The Secretary to the Government of Bengal in the Medical Department ...	<i>President.</i>
The Hon'ble Sir Patrick Playfair, Kt., C.I.E.	
The Hon'ble M. C. Turner ...	
The President of the Bengal Chamber of Commerce ...	
The Secretary to the Government of Bengal in the Public Works Department	
The Inspector-General of Civil Hospitals, Bengal ...	
The Sanitary Commissioner, Bengal	
The Principal of the Medical College, Calcutta	
Brigade-Surgeon-Lieut.-Col. R. C. Sanders	<i>Members.</i>
Brigade-Surgeon-Lieutenant-Colonel J. O'Brien	
Brigade-Surgeon-Lieut.-Col. C. H. Joubert	
Brigade-Surgeon-Lieut.-Col. E. G. Russell	
Surgeon-Lieutenant-Colonel J. Lewtas	
Surgeon-Major A. W. D. Leahy ...	
The Inspector-General of Police, Bengal	
The Chairman of the Corporation of Calcutta	
Dr. Mohendra Lall Sircar ...	
Dr. Koilash Chunder Bose ...	
Maulavi Zuhir-ud-din Ahmed, Honorary Assistant Surgeon to His Excellency the Viceroy	
Mr. W. B. Gwyther, Under-Secretary to the Government of Bengal in the Public Works Department ...	<i>Secretary.</i>

Part II.—Rules relating to Villages and Non-Municipal Towns.

2. *Appointment of plague authorities.*—In every local area where there is danger of plague, the District Magistrate, subject to the general instructions of the Commissioner, may appoint special officers, either by name or by virtue of office, to devise and carry out, under the District Magistrate's general directions, all measures necessary to prevent the spread of the plague. The special officers appointed for any local area under these rules shall be known as plague authorities.

3. *Duties of proprietors of lands.*—Every village headman, every owner and occupier of land and the agent thereof, and every person employed in the collection of revenue by Government or the Court of Wards, shall use his best endeavours to secure full compliance with the following provisions as to the immediate reporting to the nearest police-station of the occurrence of each case of plague on his property, as to the segregation of the sick and their attendants, as to the disinfection of the houses of persons who have suffered from plague, and as to the disposal, in accordance with the customs of their religion, of the bodies of those who have died.

4. *Duties of Station Officers, Rural Police and Chaukidari Panchayats.*—Every rural policeman (chaukidar) shall forthwith report to his police-station or outpost the name of every person who has arrived in his village from any area declared to be infected with bubonic plague, together with the name of the householder with whom he resides, and shall also report fresh arrivals as they occur. Members of chaukidari panchayats are required to see that the above duty is faithfully performed. The names so reported, with dates, will be entered in a *Special List* to be kept at police-stations and outposts. The Station Officer shall also enter in the *Special List* the names and addresses of travellers from infected areas which are reported to him by the railway police under rule 13. He shall also for the space of ten days next following after the persons shown in the *Special List* arrived in his jurisdiction, cause the state of health of such persons to be specially reported to him.

5. Every rural policeman shall report any excessive mortality among rats or monkeys that may occur.

6. Every rural policeman shall be liable, on the requisition of the police-station or outpost officer, to do 24 hours duty at any railway

station situated within the police-station or outpost jurisdiction, and to perform there such duties as shall hereafter be prescribed by circular departmental orders.

7. *Rural Policemen to be present at railway stations.*—The District Superintendent of Police, in consultation with the District Magistrate, will arrange that two or, if necessary, more than two chaukidars shall be present throughout the 24 hours at such railway stations in his district as shall hereafter be notified from time to time. This arrangement will be made under his orders by the police-station or outpost officer, who will be held responsible that each pair or batch of chaukidars is regularly relieved after 24 hours' duty, and that each man receives subsistence allowance at the rate of two annas a day. This subsistence allowance will be paid from District Board or other District Funds under arrangements to be made by the Magistrate.

8. *Inquiry to be made when death reported of person entered in Special List.*—On receiving intimation of the illness or death of any person entered in the *Special List* referred to in rule 4 or of any person residing in the same household, the station or outpost officer shall institute inquiry to ascertain whether the deceased has or had symptoms of plague as described in the memorandum annexed, and shall report his action by an entry in red ink in the Station Diary. He shall also inform the nearest plague authority.

9. *Increased mortality in villages to be inquired into.*—Whenever the deaths reported from any village are more numerous than usual, and especially sudden deaths due to fever, the station or outpost officer shall forthwith make enquiries in order to ascertain whether the symptoms of bubonic plague existed, and will, when forwarding "The weekly statement of deaths to the Civil Surgeon," prescribed by Bengal Police Circular No. 2 of March 1897, call the Civil Surgeon's attention to the increased rate of mortality.

10. *Result of enquiry under preceding rules to be reported to Civil Surgeon.*—The station or outpost officer shall forthwith report to the Civil Surgeon and to the nearest plague authority the result of the enquiries made under either of the last two preceding rules, and shall make an entry in red ink for the information of the District Superintendent and Magistrate in the Station Diary which is despatched daily.

11. *Magistrates and superior Police Officers required to supervise.*—Magistrates and the superior police officers should, whenever practicable, attend the weekly muster parades at which all the rural policemen are assembled, so as to be able by interrogation and by

enquiry to satisfy themselves that the rules laid down in this Regulation are being duly carried out.

12. *District and Rural Police to assist plague authorities.*—The District and Rural Police shall give to the plague authorities any assistance they may require to enable them to carry out the duties they have to perform under this Regulation.

13. *Duties of Railway Police.*—Assistant Inspectors-General of the Railway Police are required to work in cordial co-operation with the District Police. It is their duty to arrange, on the arrival of trains, that the railway police prepare lists containing the names and residences of travellers from infected areas; these lists, after being checked from the tickets collected, will be forwarded to the station police. When there is reason to suspect that a traveller has given either a wrong name or wrong residence, one of the chaukidars referred to in rule 7 will be sent with him to verify the information given. A small itinerant staff will be sanctioned for each Assistant Inspector-General to ensure that the rules prescribed for observance at railway stations are being strictly carried out, and that travellers are not evading examination and observation by alighting at intermediate stations and taking fresh tickets.

14. *Breaking railway journey.*—In the event of a traveller from an infected area alighting at an intermediate station with the object of obtaining a fresh ticket, so as to conceal the fact that he comes from an infected area, the railway police will take down his name and the number of the fresh ticket issued, and will send information down the line so that he may, on alighting, be placed under observation.

* 15. *Duties of plague authorities.*—Immediately on receiving information under the preceding rules, or whenever he thinks house visitation necessary, the plague authority shall go to the place indicated, and if the place be a house or dwelling-place, and if the occupants thereof do not (on his demand) allow him to enter and give him reasonable facilities for ascertaining whether any of the inmates are suffering from the plague, such authority is empowered to enter into such house or any part thereof by force, and to detain for the purpose of medical examination, any person found therein to be suffering or suspected to be suffering from the plague, or in his opinion likely to have been infected, *e.g.*, owing to his having lived in the same house with a plague patient. Such plague authority, if he be not himself a medical officer, shall without delay send word to the nearest medical officer in the service of Government or

of any local authority, and such medical officer, whether appointed a plague authority for the locality or not, shall be bound to come to the place indicated and examine and report on the case. If the case prove to be one of plague, the plague authority may, in his discretion, proceed under rules 43 to 52 inclusive so far as they are applicable.

16. A plague authority is empowered to have the cause of death inquired into in every case, and, unless satisfied, to treat the case as one of plague.

17. Every medical officer appointed under these rules as a plague authority is empowered to examine all persons whom he discovers, or about whom he receives information under the provisions of the preceding rules, and to detain and segregate persons suffering or suspected by him to be suffering from the plague, in such places as may be appointed by the District Magistrate or officer specially deputed by him in this behalf for the accommodation of such persons respectively. For the purpose of segregating people the District Magistrate or officer specially authorised by him in this behalf may take possession of and occupy any vacant ground or building, such compensation being afterwards made to the owner or occupier thereof as may be fixed under rule 55.

18. If a medical officer appointed under these rules as a plague authority has reason to believe that any building used or intended to be used as a dwelling is or has been occupied by a sufferer from the plague, or if it appears to him that any such building is in such an insanitary condition as to be unfit for human habitation, he may prohibit by a written order the further use of such building as a dwelling-house. When any such prohibition has been made, the owner or occupier of such building shall use or suffer the same to be used for human habitation until the said officer gives him written permission in this behalf. For the purpose of enforcing this rule the said officer may, if necessary, forcibly remove or cause to be removed any person from such building.

19. If a medical officer appointed under these rules as a plague authority consider it necessary that the inhabitants of the village in which bubonic plague is prevalent should be located in a temporary settlement at a distance from the village, in the manner indicated in rule 50, he shall make a report to that effect to the Magistrate of the district, and the latter may direct the inhabitants to vacate their houses accordingly. The houses shall in this case not

be again occupied till they are certified by a Medical officer to have been thoroughly disinfected.

20. Should plague appear in a village, the people of surrounding villages should be warned to have no communication with the infected village until the disease has completely disappeared.

21. *Duties of the Public.*—Every person to whom an order is given by any plague authority with regard to his segregation, the disinfection of his house or personal property, or with regard to any other matter falling under these rules, shall duly obey that order.

Part III.—Rules relating to Municipal Towns and Cantonments.

22. The following rules apply to every Municipality and to every Cantonment. Rules 23 to 42 and 55 to 57 inclusive shall come into force at once. They shall forthwith be translated into the vernacular of the District and deposited in the office of the District Magistrate, the Cantonment authority, and the Municipal Commissioners, and a copy shall be posted up in a conspicuous position at such office and in such other public places as the Magistrate of the district, the Cantonment authority or, in Calcutta, the Chairman of the Corporation, may direct. And a public proclamation shall be made throughout the Municipality or Cantonment by beat of drum, notifying that such copy has been so posted up, and that the original is open to inspection in the office of the Municipal Commissioners or Cantonment authority. The remaining rules shall come into force in any Municipality or Cantonment as soon as the Magistrate of the district or the Cantonment authority or, in Calcutta, the Chairman of the Corporation, is satisfied that a case of plague has occurred in that Municipality or Cantonment, or in a place near enough to cause risk of the infection spreading. In every such case the rules shall be published in the manner prescribed above.

23. *Health Officer defined.*—The words "Health Officer" in the following rules mean the Civil Surgeon of the district, and include a Civil Medical Officer, a Military Medical Officer in charge of a cantonment, an Assistant Surgeon in medical charge of a district or subdivision or a municipal dispensary, and a Medical Officer appointed by the District Magistrate under rule 24. In Calcutta Health Officer means the Health Officer of Calcutta and includes an Assistant Health Officer.

24. *Appointment of Health Officers.*—In every Municipality or Cantonment where there is danger of plague, the District Magistrate,

subject to the general instructions of the Commissioner, may appoint a Health Officer, either by name or by virtue of office, to devise and carry out, under the District Magistrate's general directions, all measures necessary to prevent the spread of the plague and may fix his pay. He may also appoint such subordinate staff, to assist the Health Officer in carrying out his duties, as he may consider necessary, and may fix their pay. For the purposes of this rule, the District Magistrate may group Municipalities and Cantonments and may appoint a Health Officer and staff for the combined area. In Calcutta these powers shall be exercised by the Chairman of the Corporation subject to the instruction of the Local Government.

25. Duties of Town Police at railway stations.—When a railway station is situated within or close to municipal boundaries, the railway police, in co-operation with the town police, will arrange to meet trains on arrival and to prepare lists containing the names and residences of travellers from infected areas who may alight. These lists, after being checked against the tickets collected, will then be sent to the town police-stations. When a traveller is suspected of giving a wrong name or wrong residence, one of the town policemen present will be sent with him to verify the information given.

26. Town Police to report arrivals from infected parts and to keep them under observation.—The town police are required to report at once to the police-station the name of every person arriving from parts of the country infected with the bubonic plague who take up their temporary or permanent residence within the limits of their beats. The names so obtained, together with those referred to in the preceding rule, with dates of entry, will be entered in the *Special List* to be kept at town police-stations. A copy of this *Special List* will be sent to the District or Cantonment Magistrate and to the Health Officer, all new names being notified to them without delay. The town police are required to submit daily reports regarding the health of all the persons in the *Special List*, until a period of ten days from date of arrival has expired. In Calcutta the list shall be sent and reports shall be made to the Commissioner of Police and Health Officer.

27. Duties of Railway Police when travellers from infected areas break their journey and take fresh tickets.—In the event of a traveller from infected areas alighting at an intermediate station with the object of obtaining a fresh ticket so as to conceal the fact that he is a traveller from an infected area, the railway police will take down his name and the number of the fresh ticket issued, and will send

information down the line so that he may, on alighting, be brought under observation.

28. *Town Police to report illness or death from bubonic plague.*—On receiving information of illness or death from bubonic plague, the officer in charge of a town police-station shall forthwith report the matter to the Chairman of the Municipality or Cantonment Magistrate, and shall also make an entry in red ink in the Station Diary for the information of the District Superintendent and Magistrate. In Calcutta such report shall be made to the Commissioner of Police and Health Officer.

29. *Unless otherwise specially authorised, duties of Town Police confined to reporting.*—Beyond reporting the fact of illness or death, no police officer shall take any action under the rules in this part except under a written order of the executive or sanitary authority which he shall be bound to show on the application of the head of the house.

30. *Magistrates and superior police officers required to supervise.*—Magistrates and superior officers of police are required to satisfy themselves by frequent personal inspection that the above rules prescribing the duties of the police are strictly carried out.

31. *Police required to assist the Health Officer.*—All police officers are required to give to the Health Officer such assistance as he may consider necessary in carrying out the rules of this Notification. In Calcutta such assistance shall be given by the Commissioner of Police on the requisition of the Chairman of the Corporation.

32. *Committees of Inspection.*—In every municipality and cantonment, Committees of inspection shall be appointed by the Magistrate of the district or Cantonment authority for the purpose of assisting the Health Officer in performing his duties under these rules. Each Committee should usually consist of four members, two Hindus and two Muhammadans, for each ward of a municipality or definite portion of a cantonment; and their most important duties will be to accompany the Health Officer on his rounds of inspection, to explain the necessity of the sanitary measures adopted, to assist in causing these to be carried out, and to bring to notice any complaints that may be made or abuses that they may discover. At least one Hindu and one Muhammadan on each Committee shall, if possible, be medical men. In Calcutta the Committees shall be appointed by the Chairman of the Corporation in consultation with the Commissioner of Police. In places where a large proportion

of the population consists of persons other than Hindus or Muhammadans, the Committees shall, if possible, comprise representatives of the races and religions affected by the rules in each ward.

23. General sanitary precautions.—In any municipality or cantonment the Magistrate of the district or any Magistrate authorized by him in this behalf or the Cantonment authority may issue general orders that by a certain specified date certain sanitary precautions of a simple nature, such as the lime-washing of houses, the cleaning of latrines, the removal of filth and rubbish, and of partitions which obstruct light and ventilation, shall be carried out within any specified area, and all persons residing within such area shall be bound to give effect to these orders. In Calcutta these powers shall be exercised by the Chairman of the Corporation. If within such time such persons fail to carry out the operations specified in the notice, the Health Officer may, with the sanction of the Magistrate of the district or of the Cantonment authority, or, in Calcutta, of the Chairman of the Corporation, enter upon the premises at any time between sunrise and sunset, after giving such notice of his intention as shall under the circumstances appear to him to be reasonable, and carry out the measures specified above: Provided that when an apartment is occupied by a female who, according to the custom of the country, does not appear in public the Health Officer shall give at least one hour's notice of his intention to enter such apartment, and shall afford her every reasonable facility for withdrawing from such portion of the apartment as he may desire to enter. The expenses incurred may be recovered from the persons concerned under section 360 of the Bengal Municipal Act, 1884, or section 440 of the Calcutta Municipal Consolidation Act, 1888, as the case may be.

34. Insanitary premises.—When any premises are in such an insanitary state as in the opinion of the Health Officer to make the inmates thereof especially liable to an attack of the bubonic plague, he may require the owner by notice to have the whole or any portion of such premises cleansed within a specified time in such manner as may appear to him necessary, and may in consultation, if necessary, with a competent engineer, direct the owner to remove all structures, partitions, erections or portions of house-walls which obstruct light and ventilation. If within such time the owner fails to carry out the operations specified in the notice the Health Officer may, with the sanction of the Magistrate of the district or of the Cantonment authority, or, in Calcutta, of the Chairman of the Corporation, enter upon the premises at any time between sunrise and sunset, after giving such notice of his intention as shall, under the circumstances, appear

to him to be reasonable, and carry out the measures specified above: Provided that when an apartment is occupied by a female who, according to the custom of the country, does not appear in public, the Health Officer shall give at least one hour's notice of his intention to enter such apartment, and shall afford her every reasonable facility for withdrawing from such portion of the apartment as he may desire to enter. The expenses incurred may be recovered from the owner under section 360 of the Bengal Municipal Act, 1884, or section 440 of the Calcutta Municipal Consolidation Act, 1888, as the case may be.

25. *Overcrowded dwellings.*—When a dwelling is so overcrowded as, in the opinion of the Health Officer, to make the inmates thereof especially liable to an attack of the bubonic plague, the Magistrate of the district or the cantonment authority or, in Calcutta, the Chairman of the Corporation, may, by a notice posted on some conspicuous part of the dwelling, require the owner or the occupier, if actually residing in the dwelling, or the tenants or the actual inmates thereof, to abate the overcrowding within 24 hours by reducing the number of lodgers, tenants or other inmates of the said dwelling as prescribed in the notice, or to vacate the dwelling. In default of compliance with the requisition in the said notice, the Magistrate or Cantonment authority or, in Calcutta, the Chairman of the Corporation, may summarily eject all the inmates, or reduce the number of inmates in such manner and to such extent as may appear necessary. The Magistrate or Cantonment authority or, in Calcutta, the Chairman of the Corporation, shall provide the inmates so ejected, when necessary, with temporary accommodation.

36. *Prohibition of rag-picking.*—No person, except municipal or cantonment servants, shall pick up rags or other refuse in the streets or elsewhere; nor shall rags or refuse be transported, except under such conditions as may be prescribed by the Health Officer. Any person picking up rags or other refuse in the streets or elsewhere shall be liable to be arrested by the police. The Magistrate of the district, or the Cantonment authority, or in Calcutta the Chairman of the Corporation, may disinfect or at his discretion destroy any collection of rags in rag-pickers' houses or rag stores.

37. *Provision of hospitals.*—It shall be lawful for the Magistrate of the district, or the Cantonment authority or, in Calcutta, the Chairman of the Corporation, to select a site and erect a hospital thereon, or to convert any building, not being a place of worship, into a hospital for the isolation of patients suffering from the plague, in any locality

which, in the opinion of the Health Officer, may be suitable for the purpose. In such hospital separate and suitable accommodation shall be provided for females, having regard to their rank and station in life. The owner or lessee of such site or building shall not be entitled to claim from the Magistrate, Cantonment authority or Chairman anything beyond a reasonable rent or the period during which the site or building may remain in his occupation. Before vacating the building the Magistrate, Cantonment authority or Chairman shall cause it to be thoroughly cleansed and disinfected both externally and internally.

38. Provision of accommodation.—It shall be lawful for the Magistrate of the district or the Cantonment authority or, in Calcutta, the Chairman of the Corporation, to select a site and erect thereon temporary accommodation, or to convert any building, not being a place of worship, into accommodation for the segregation of persons suspected to be infected with plague, or for the residence of persons compelled to vacate their houses under these regulations. The owner or lessee of such site or building shall not be entitled to claim from the Magistrate, Cantonment authority or Chairman anything beyond a reasonable rent for the period during which the site or building may remain in his occupation. Before vacating the building the Magistrate, Cantonment authority or Chairman shall cause it to be thoroughly cleansed and disinfected both internally and externally.

39. Reports from factories.—Every occupier of a factory shall on employing in his factory any person who has come from any area declared to be infected with bubonic plague immediately report in writing to the Magistrate of the district the fact of such employment and the name and address of the person employed. In Calcutta such report shall be made to the Chairman of the Corporation.

The word "factory" used in this rule means any premises wherein is carried on any process, or incidental to, making, altering, repairing, ornamenting, finishing or otherwise adapting for use or sale any article or part of an article, and wherein steam, water, or other mechanical power is used in aid of any such process.

40. Report by householder.—If in any house a person suffers from sudden fever, glandular swellings in the neck, armpits or groin, pain in the chest with cough and feeling of oppression, or delirium, or dies from such fever or with any of the foregoing symptoms, the owner of such house, or, if the owner be non-resident, the occupier, or the person who collects rent for the house or any part of it, shall forthwith report the occurrence of such illness or death at the nearest police-station. In Calcutta such report shall be made to

the Health Officer or at the nearest police-station by any person who would be bound, under section 186 of the Calcutta Municipal Consolidation Act, 1888, to give information of a death in the house.

41. If there is or has been resident in any house a person who has come from any area declared to be infected with bubonic plague, the owner of such house or, if the owner be non-resident, the person who collects the rent of the house or any part of it, shall report at the nearest police-station (1) the illness of any person in such house, or (2) the death of any person in such house, immediately such illness is apparent or death occurs. In Calcutta such report shall be made to the Health Officer or at the nearest police-station by any person who would be bound, under section 186 of the Calcutta Municipal Consolidation Act, 1888, to give information of a death in the house.

42. *Report by medical practitioner.*—Any medical practitioner who attends in any house a case which he has reason to believe to be a case of bubonic plague shall forthwith report such illness to the nearest police-station. In Calcutta such report shall be made to the Health Officer.

43. *Disinfection, cleansing, etc., by house-holder.*—The owner and occupier of any house in which a case of plague has occurred, and the head of any family resident therein, shall comply with any direction that may be issued by the Health Officer with regard to the disinfection and cleansing of the house, the disinfection or destruction of bedding, clothing and articles of a similar nature, the improvement of the sanitary condition of the premises, the removal, in consultation with a competent engineer, of all partitions, erections or portions of house walls which obstruct light and ventilation, and other sanitary matters; and shall permit the Health Officer (who shall endeavour to procure the attendance of a member of the Committee appointed under Rule 32) to enter his house or premises, for the purpose of inspection. Provided that, when an apartment is occupied by a female who, according to the custom of the country does not appear in public, the Health Officer shall not enter such an apartment without giving notice and affording time to such female to withdraw. In such inspections the Health Officer shall, if possible, always be accompanied by a male member of the family.

44. *Disinfection, cleansing, etc., by Health Officer.*—The Health Officer shall, if he considers it necessary, himself take measures for the disinfection of the house and for the other matters referred to in the preceding rule. Should the Health Officer think it necessary and

practicable to burn or otherwise destroy any non-masonry and inflammable structure, he will report the case to the Magistrate of the district, or Cantonment authority, or in Calcutta, to the Chairman of the Corporation, and act on his orders. The Magistrate of the district, or in his absence the Magistrate in charge of his duties, or the Cantonment authority, and in Calcutta the Chairman of the Corporation, may order the burning or destruction of any hut or other temporary structure, if disinfection cannot be satisfactorily effected otherwise, awarding compensation to persons who are so poor as to be unable to replace at their own expense the structure that has been burnt or destroyed.

Right of entry and examination.—The owner and occupier of any house shall permit the Health Officer to enter his premises and examine any person whom such Health Officer has reason to believe to be infected with bubonic plague. If the person be a female who, according to the custom of the country, does not appear in public, the examination shall be made through a female doctor, female hospital assistant or other female agency.

46. *Segregation.*—(1) If on examination of any person under the last preceding rule the Health Officer suspects that such person is suffering from or infected with plague, he may cause such person to be removed to a hospital, and may arrange for his detention, dieting and medical treatment therein. He may also cause the other occupants of the house in which such person resides to be removed to a segregation camp and to be detained under observation for ten days.

(2) When private plague hospital or segregation camps have been provided and fully equipped by or for particular castes, classes, joint families or associations of families, and the Health Officer, or, in Calcutta, not less than two members of the Plague Commission empowered thereto by the President, have in writing approved of the site, plan, furniture and arrangements for isolation and medical administration of such hospitals and camps, sick or suspected persons may, if they so desire and if accommodation is available, be removed to the private hospital or segregation camp constructed for the use of the caste, class or family to which they belong, instead of to a public hospital or camp.

(3) In both public and private camps and hospitals separate and suitable accommodation shall be provided for females, and in the case of a female who by the custom of the country does not appear in public, her *parda* shall be strictly preserved, both in removal to the camp or hospital and during her stay there.

(4) The relatives, friends, *hakims*, *baid*s and priests of sick persons shall be allowed free access to them during the day-time, subject only to such precautions as the Health Officer may consider necessary.

(5) Members of the family of a sick person who are in attendance on him may also be admitted to a hospital, whether public or private, provided that they shall sleep in the compound in suitable accommodation provided for the purpose, and not in the hospital itself.

Explanation 1.—It is not necessary that hospitals provided in accordance with this rule should be constructed in remote or inconvenient situations.

Explanation 2.—Persons desirous of taking advantage of clause (2) should at once communicate with the Plague Commission and satisfy that body of their ability to provide adequate hospitals and camps when plague breaks out.

Explanation 3.—Private hospitals and camps may be closed by order of the Plague Commission, if the Health Officer reports that medical attendance and segregation are not maintained to his satisfaction, or that the conditions on which such camps or hospitals were sanctioned are not complied with.

47. If in any case a person removed to a public or private hospital is accompanied by friends or attendants, the Health Officer may require so many of them as are not in personal attendance on the patient to live in the immediate neighbourhood of the hospital in segregation huts or tents provided for the purpose, and to remain in such place until they receive permission from the Health Officer to depart.

48. If a person is attacked with bubonic plague while so segregated, the Health Officer shall remove such person to a public or private hospital, and may treat his friends and attendants as provided in the preceding rule.

49. Upon the death of a sick person from bubonic plague, the Health Officer may cause the other occupants of the house in which the person was ill or in which his death took place to be removed to a segregation camp and detained there for ten days. Provided that this rule shall not apply to any medical practitioner, *hakim* or *baid* who may at any time attend upon a sick person, or to professional corpse-bearers, mourners and friends who have not been in attendance on the deceased. The Magistrate of the district or the Cantonment authority, or in Calcutta the Chairman of the Corporation, may grant

subsistence allowance, at rates suitable to their station in life, to persons detained under this rule.

50. *Evacuation of street or quarter.*—If bubonic plague has become prevalent in a portion of a municipality or cantonment, the Magistrate of the district or the Cantonment authority, or in Calcutta the Chairman of the Corporation may, with the sanction of Government, direct the inhabitants of any street, muhalla or other locality to vacate their houses and to remove to a temporary settlement at a distance from the infected quarter. The District Magistrate or the Cantonment authority, or in Calcutta the Chairman of the Corporation, may, when necessary, provide such persons with temporary accommodation. Each householder shall be permitted to make suitable arrangements for the care of his house and property during his absence, and the Municipal Commissioners or Cantonment authority, as the case may be, will arrange for the watch and ward of the empty houses. After evacuation, the Health Officer shall arrange for the thorough disinfection and cleansing of the empty premises, and the inhabitants shall not be permitted to return until the premises have been certified to be free from infection.

51. *Duty of compliance.*—A person dealt with under the foregoing rules, and any person who may be removed to a hospital by order of the Military Medical authorities or of the Health Officer of the Port of Calcutta, shall comply with any directions that may be given to him by the Health Officer with regard to his removal to, and residence in, an observation shed, public or private hospital or place of segregation, and with respect to disinfecting or burning of bedding, clothing and articles of a similar nature, or with respect to any other sanitary matter. He shall not depart from any such place without the written permission of the Health Officer.

52. *Disposal of dead.*—The friends of the deceased shall be permitted to dispose of the corpse by cremation or burial in accordance with their religious practices, but they shall obey the directions of the Health Officer or other sanitary or executive authority as to the time, route and method of removing the corpse to the burial or cremation place. In the event of the 'failure' or refusal of relatives or friends of the deceased to dispose of the body, the Health Officer shall dispose of it in accordance with the religion of the deceased. The corpses of Europeans or Muhammadans who die of plague shall be buried, if possible, at least six feet deep. The place of burial, if not an authorised cemetery, should be far from habitations and should be so situated that there may be no risk of contaminating sources of water-supply. The coffin and cloth used to cover

the corpse, when not interred with the corpse, shall be destroyed. In cases where cremation is the custom, the body shall be completely burned at the usual burning ghat or other isolated locality in accordance with custom, the cloths brought in contact with the body being either burnt according to custom or disinfected.

53. *Ambulances.*—The Magistrate of the district or the Cantonment authority, or in Calcutta the Chairman of the Corporation, shall provide suitable conveyances, painted in a conspicuous manner, for the free carriage of persons suffering, or suspected to be suffering, from the plague, and it shall be lawful to drive or carry such conveyances through any public or private thoroughfare.

54. *Disinfection of public conveyances.*—Any conveyance, public or private, that has been used by a person infected with, or suspected of being infected with, plague shall be thoroughly disinfected and exposed to air and sunlight for not less than twenty-four hours before being again used, and all articles of furniture belonging to it, which in the opinion of the Health Officer cannot be properly disinfected, shall be destroyed by fire.

Part IV.—Rules of General Application.

55. *Compensation.*—The Magistrate of the district or Cantonment authority, or in Calcutta the Chairman of the Corporation, may in his discretion, pay compensation to any person who has sustained, substantial loss or damage by reason of anything done under these regulations ; provided, however, that no person shall be entitled as of right to claim any compensation whatsoever. In deciding claims to compensation, the Magistrate or the Cantonment authority, or in Calcutta the Chairman, shall consult the Committee appointed under rule 32, but shall not be bound to follow their advice.

56. *Control.*—All powers conferred upon the Health Officer or on a plague authority by these rules shall be exercised subject to the general control of the Magistrate of the district, or in Calcutta of the Chairman of the Corporation.

57. *Expenses.*—Subject to the provisions of Rules 33 and 34 all expenses incurred in carrying out these rules shall, in the first instance, be paid from the Municipal or District Fund or from loans made under the Local Authorities (Emergency) Loans Act, 1897 ; but the Magistrate of the district or the Cantonment authority, or in Calcutta the Chairman of the Corporation, may recover from any person any amount which such person would under similar circumstances be liable to pay to the Commissioners under the Bengal Municipal Act, 1884, or the Cantonment Act or Rules, or the Calcutta Municipal Consolidation Act, 1888, as the case may be.

Jurisdiction of the Military Authorities at Calcutta.

Rules for dealing with cases of actual or suspected plague occurring within the jurisdiction of the military authorities at Calcutta.

No. 1399-D., dated Fort William, the 22nd March 1897.

No. 43.

From—MAJOR-GENERAL P. J. MAITLAND, Secretary to the Government of India, Military Department,

To—The Quarter Master General in India.

I am desired to acknowledge the receipt of your letter No. 314-B.—Camp, dated 19th March 1897, submitting, for approval, draft rules for dealing with cases of actual or suspected plague occurring within the jurisdiction of the military authorities at Calcutta. It is stated that the rules were framed by the Principal Military, Medical and Civil authorities at a Conference held at Calcutta on the 18th March last.

2. In reply I am to say that the Government of India approve the rules which will be communicated to the Government of Bengal.

Proceedings of a Conference held at Calcutta on the 18th March 1897.

Present :

Surgeon-Major-General Gore, Principal Medical Officer, Her Majesty's Forces in India.

Major-General Badcock, Quarter Master General in India.

Honourable H. Risley, Financial Secretary, Bengal Government.

Surgeon-Colonel Franklin, Officiating Inspector-General, Civil Hospitals, Bengal.

H. C. Williams, Esq., Chairman of the Corporation of Calcutta.

Dr. Simpson, Health Officer, Calcutta.

Major-General Badcock read the orders of His Excellency the Commander-in-Chief, referring to the Conference the question of the arrangements to be made to deal with future actual or suspected cases of plague occurring in Calcutta under the jurisdiction of the military authorities.

The following rules were framed :—

- I.—If, on examination of a sick person, the examining military medical officer suspects that such person is suffering from, or infected with, plague, he shall at once send intimation to a civil medical officer designated for this purpose by the Inspector-General, Civil Hospitals, Bengal.

II.—The Civil Medical Officer shall thereupon proceed to examine the patient in consultation with the Military Medical Officer.

- III.—If the two consulting officers agree, the case is one of plague or of suspected plague, they shall record their opinion to this effect and shall send a copy to the Health Officer of Calcutta, with a statement of the case.

IV.—The military authorities shall then arrange in communication with the Civil Police, for sending the case, in a military ambulance, accompanied by a medical subordinate to the isolation hospital at Maniktolla. The medical officer in charge of the hospital shall countersign the duplicate sick report.

V.—If the two consulting medical officers fail to agree in their diagnosis of the case, the Principal of the Medical College shall be called in and the decision of the majority shall be final.

VI.—On the termination of the case, the Health Officer shall report to the military authorities, Fort William.

VII.—Nothing in these rules shall be held at present to apply to British troops, but any case of plague or suspected case of plague that may occur amongst such troops shall be notified at once to the Inspector-General, Civil Hospitals, Bengal, and Health Officer, Calcutta.

Regulations issued by the Government of the North-Western Provinces and Oudh.

GENERAL REGULATIONS.

No. 44. **READ** Resolution No. $\frac{57}{XVI-404-B}$, dated the 12th February 1897.

Act No. III of 1897, an Act to provide for the better prevention of the spread of Dangerous Epidemic Disease.

Notification No. 302, dated 4th February 1897, of the Governor-General of India in Council, directing that the powers conferred by the said Act may be exercised by the Government of the North-Western Provinces and Oudh, with respect to the territories administered by it.

Letter No. $\frac{38}{XVI-404-B}$, dated 29th January 1897 (Sanitation Department), from the Secretary to Government, North-Western Provinces and Oudh, to the Inspector-General of Civil

Hospitals conveying instructions with reference to the detection of cases of bubonic plague.

Observations at railway stations. The measures hitherto adopted.

OBSERVATIONS.—The adoption of measures to prevent the introduction into these Provinces of the bubonic plague now prevalent in Bombay has occupied the attention of this Government. Hitherto the measures adopted have consisted in the appointment of subordinate medical officers to the principal railway stations on the frontier and at railway junctions to observe the condition of passengers arriving from Bombay, and in the independent action by District Officers in keeping under observation persons known to have returned to their homes in these Provinces from the Bombay Presidency. The observation, however, at railway stations cannot lead to the detection of cases in which the prominent symptoms of plague are not apparent, much less to the detection of cases in which the disease is in the state of incubation and has not disclosed itself; and the independent action of District Officers needs to be extended and regulated.

Importance of ascertaining the health of immigrants from the Bombay Presidency and of adopting sanitary precautions.

2. It appears that there is considerable intercourse between certain districts of these Provinces and Bombay. For instance, many weavers are known to have sought employment in the Bombay direction. With the large exodus taking place from Bombay at present, there is reason to believe that these and other persons are returning to their homes in these Provinces; a system of general observation is therefore necessary, and towns and villages the inhabitants of which are known to be directly connected with Bombay require above all to be carefully watched. It has become a matter of urgent necessity to establish a system of ascertaining the health of these immigrants and of immigrants who have already returned to their homes from Bombay, and of taking all sanitary precautions to prevent the spread of the disease should it break out—precautions which recent legislation has placed it in the power of the Government to adopt.

Agency in rural villages.

3. *Rural villages.*—The agency at the disposal of the Government in the interior of a district for ascertaining the required information is at present four-fold. First, there is the Police. Second, the Revenue Staff [patwari, kanungo, etc.]. Third, the officers at present engaged in Famine Relief in certain districts. Fourth, the Hospital Assistants at the Branch Dispensaries. Each organization must now be turned to the best account for the object above stated; and detailed rules defining clearly the duties of each class of officer, issued by the Government under Act No. III of 1897, are appended to this Resolution [Annexure A, Part I].

Registers to be maintained in

4. In every district lists will be made out of villages known to be directly connected, by trade relations or otherwise, with those parts

of India in which bubonic plague is prevalent. To such villages the rules relating to the reporting of deaths when cholera is epidemic will be applied, that is to say, daily reports will be required. At the same time, a register will be prepared in each police station, from reports furnished by village policemen, of all persons who have returned from any part of the Bombay Presidency since the beginning of January, or who may return in future so long as these regulations are in force. On receiving information of the death of any person whose name is recorded on the register or who resided in any village from which daily reports are submitted, or on finding that an unusually large number of deaths are returned from any village in his circle, the officer in charge of the police station will inquire into the symptoms which are alleged to have preceded death. If there is reason to believe that these answer the description of the symptoms of bubonic plague given in the instructions issued for his guidance, the officer in charge of the police station will go to the village concerned, and pending the arrival of a superior officer will, in a case of ascertained plague, take certain precautionary measures with a view to the prevention of the spread of the disease in the village. The Tahsildars, who will also receive information through the patwaris, will supervise the action taken by the police, and give such assistance as may be required by the circumstances of the case.

villages having intercourse with the Bombay Presidency. Enquiries in such villages and procedure on occurrence of suspected cases.

5. From the inquiries made in Karachi and Calcutta, it appears, that the best practical means of checking the increase of the plague has been found to be the abandonment and thorough disinfection of infected houses and localities, and the removal of the inhabitants to camps constructed in the open, and the Lieutenant-Governor and Chief Commissioner wishes this principle to be kept prominently in view. It will be the duty of the district authorities to take steps to secure the temporary abandonment of infected houses, and if such a course be necessary, of infected villages or portions of villages. The inhabitants should camp in the open or under trees at a suitable distance from the infected spot, and will not be allowed to return until the place has been thoroughly ventilated, disinfected and pronounced fit for occupation by the medical officer.

Evacuation and disinfection of infected localities.

6. *Municipalities and small towns.*—The rules applying to villages will be applied, *mutatis mutandis*, to municipalities, cantonments and towns administered under Act XX of 1856. Here also the chief remedy to be adopted is temporary evacuation of infected houses or mahallas, and the occupation of temporary settlements well beyond the limits of the town, until return is permitted. The Lieutenant-Governor and Chief Commissioner desires to impress upon Municipal

Sanitary measures in municipalities and small towns. Evacuation of infected quarters.

Boards the urgent necessity of scrutinizing the death returns, of checking, so far as possible, the recorded causes of death, and of supervising most carefully the sanitary arrangements, a duty which has already been urged upon them in G. O. No. ²⁶²⁵_{XI-235-B}, dated 16th October 1896. It is especially necessary that the latrine arrangements of all private masonry houses in towns should be at once examined, and put in a thoroughly satisfactory condition. For the Benares Municipality an Assistant Surgeon has already been appointed as Special Health Officer, and similar appointments will be made in the large towns of Agra, Allahabad, Cawnpore, Fyzabad, Lucknow, and Meerut: the services of commissioned medical officers will, if possible, be obtained for the purpose. The Government looks to the Civil Surgeon or to the Special Health Officer of the Municipality, when such an appointment has been made, to detect and immediately report to the Magistrate of the District any suspicious case that may occur. For collecting information, the agency of the municipal police, chaukidars and the conservancy staff should be fully utilized, and where necessary strengthened.

Report of cases.

7. The rules in force in municipalities for reporting and dealing with cases of infectious disease apply only to cholera or small-pox, and are not sufficiently comprehensive in their nature: rules have accordingly been made under Act No. III of 1897 (Annexure A, Part II), providing for the reporting in municipalities, and also in cantonments, of suspicious cases of illness indicating the presence of bubonic plague, the segregating of patients, and the due disposal of the corpses of persons who have died of the disease. These rules will be publicly notified in all places where they have effect; and the attention of all Magistrates is drawn to the fact that a breach of the rules is punishable under section 188 of the Penal Code. The military authorities will be asked to co-operate in giving effect to the regulations within the limits of cantonments.

Plague on relief works.

8. *Relief works.*—The occurrence of any case of plague on relief works will be immediately dealt with by segregation under the orders of the officers in charge of the works. Immediate notice of such case will be sent to the nearest Medical Officer, the District Engineer and to the Magistrate of the District. The associates of any person seized with plague symptoms will be segregated and placed in a gang by themselves. Special attention shall be paid to the food grain sold and water supplied on any work where a case of plague occurs.

Arrangements for detection of

9. *Railway stations.*—The arrangements for detecting and dealing with cases, or suspected cases, of bubonic plague at railway stations in

these Provinces have been recently revised : the rules on the subject cases at railway stations, are now re-issued as regulations under the new Act (Annexure A, Part III). It is not practicable to post a medical officer on duty at every railway station in the Provinces. The most that can be done is (1) to provide Medical Officers for special duty at stations on the border of the Provinces, or at important junctions with a view to the careful examination of passengers and the detection of suspicious cases, and (2) to direct subordinates of the Medical or Sanitation Department to be in attendance at the larger stations in the interior and at less important junctions to assist the station masters in watching for cases of plague. As regards the former measure, at Manikpur, Jhansi, Saharanpur, and Ghaziabad, the duties of inspection and of carrying out the prescribed measures on detection of a case of bubonic plague devolve on commissioned Medical Officers, officers of the rank of Civil Surgeon, or Military Assistant Surgeons, assisted by female medical practitioners or female medical subordinates who will be stationed at those places for the purpose. At these four places, which command the approaches to the Provinces from Bombay and Karachi (the Government of India having made arrangements for examination at Bandikui), trains from infected quarters will be stopped, and the passengers required to alight for the purpose of examination by the Medical Officer. Hospital Assistants have been appointed by the Government at the stations of Agra, Allahabad, Benares, Cawnpore, Lucknow, Moghal Sarai, and Muttra, whose sole duty is to watch the trains, and to take precautionary measures, pending the receipt of orders from the Civil Surgeon. The Sanitary Commissioner will now be requested to issue instructions to all District Superintendents of Vaccination to depute competent officers to the stations, 32 in number, falling under the second class above mentioned, to assist the railway authorities. In the case of Rampur, the authorities of the State will be asked to co-operate, and will, the Lieutenant-Governor has no doubt, render every assistance possible to the Sanitary Commissioner in making the necessary arrangements.

10. In order to supervise the arrangements generally and to assist the Civil Surgeons in the work of the control, the railway system of the Provinces has been divided into three circles, and an Inspecting Officer has been appointed by the Government to each circle, whose duty will be to travel up and down the line, to visit the observation sheds, temporary hospitals and segregation huts, and to check the work of the Hospital Assistants and other subordinates. Inspecting officers for railway circles.

11. On detection of a case at a railway station, the rules provide that the person believed to be infected with bubonic plague shall be Procedure on the detection of

cases at railway stations.

placed under observation in a shed in the neighbourhood of the railway station, until under the orders of a superior Medical Officer, he is either discharged or removed for treatment to the temporary hospital as suffering from the disease. Temporary hospitals have been, or will now be, established at suitable places in the vicinity of, but at a proper distance from, all railway stations in the Provinces where officers of the medical or vaccination department have been posted, 43 in number: they are (with the exception of Manikpur, Jhansi, Saharanpur, and Ghaziabad where special officers have charge) under the direct management of the Civil Surgeon within whose district they are situated. It is understood that the railway authorities have provided observation sheds at all such places; but if in any case this has not been done, the necessary action should be immediately taken in the matter by the Inspector-General of Civil Hospitals; in addition to observation sheds and temporary hospitals, places of segregation should be provided for use by persons accompanying a patient treated in a temporary hospital who are detained by order of a Medical Officer.

The Inspector-General of Civil Hospitals should specify to each Civil Surgeon (where this has not already been done) the extent of the accommodation required in view of the above orders, the establishment to be maintained should occasion arise, and the furniture, etc., to be provided. The Lieutenant-Governor and Chief Commissioner leaves it to the Inspector-General to issue orders, in consultation with the Sanitary Commissioner, on other matters of detail, such as the method of disinfecting houses and personal property, etc., and the provision of ambulances or *dhoolis*.

Respective duties of Government officers and railway authorities.

12. It is essential for the due apportionment of responsibility that the relative duties of the Government officials on the one hand and of the railway authorities on the other should be clearly defined. Except in the case of Allahabad, all Civil Surgeons or Medical Officers of the railway passing through their districts and as such have, it is understood, taken certain precautionary measures in communication with the railway authorities. The precautions taken vary on different lines in extent and in their character: except in the case of the East Indian Railway, the Government has no detailed information on the subject before it. It is reported that, on the East Indian Railway, measures have been adopted—

- (1) For the inspection of trains by medical subordinates.
- (2) For the removal of a passenger from the train in a suspected case, for his isolation in hospital and for disinfection of bedding, burning of clothes, etc., when he leaves.

- (3) For the disinfection of the carriages used by a suspected person or his fellow travellers, and for telegraphing the address of all such fellow passengers for the information of the local authorities of the places to which they are proceeding.

The Lieutenant-Governor and Chief Commissioner considers that to secure undivided control, together with greater efficiency in carrying out the operations, and to prevent the clashing of authority, the work detailed under heads (1) and (2) above, *i. e.*, the medical inspection of passengers, the removal of persons suffering from bubonic plague from trains or railway premises and their subsequent treatment, should, wherever possible, be undertaken, with the co-operation of the railway authorities, by Government officials who will be held responsible by the Government for the due performance of their duties; and this view has been adopted in framing under the new Act regulations defining the duties of the special medical officers appointed to the four stations on the borders of the provinces. It is understood that in cases where a railway company has arranged for the medical examination of passengers, the duty is frequently undertaken by a medical subordinate in addition to his ordinary work, an arrangement which even on sanitary grounds appears to the Government to be objectionable. Moreover, as the Agent of the East Indian Railway Company points out, such examination can only be a cursory one. At the few places where a special medical officer has been employed by a railway company, *e.g.*, Allahabad, he might remain on duty, as an additional precaution, to co-operate with the Government official in the work.

The railway authorities of all lines on the other hand should be directly responsible for the performance of duties of the nature indicated under head (3) above, which clearly fall entirely within their province. Rules 39, 54, 56, 66, 67, 68, 69 and 82 of Annexure A deal more particularly with the duties of railway officials.

It is desirable that a railway carriage in which a case of plague has occurred should be kept unused, after being thoroughly disinfected on a siding for ten days. The Managers and Agents of the various railway lines will be addressed on this subject, and also with regard to the method of disinfecting such carriages.

*13. Under section 2 of Act No. III of 1897, it is open to the Local Government, which has been duly authorized to that end by the Governor-General in Council, to determine in what manner and by whom any expenses incurred in carrying out the prescribed measures Apportionment of expenditure.

should be defrayed. The expenses connected with the erection of temporary hospitals, the dieting and segregating of patients, the treating them in hospital and other similar measures will, till further orders, be borne, as the case may be, by the Government or by the local authority concerned. If in any case it is considered inequitable that the cost of disinfecting a house or taking other similar measures should be defrayed by the person benefited thereby, a special report should be made to the Government for orders. Magistrates are hereby authorized to incur any emergent expenditure that may be necessary from their contract grants, and to make advances to the medical officers or to the police for the purpose. Orders regarding the method of adjustment will be subsequently issued. The cost of erecting observation sheds in the neighbourhood of railway stations should in the Lieutenant-Governor's opinion fall upon the railway companies concerned.

Duties of the
Sanitary
Commissioner.

14. Up to the present, the Sanitary Commissioner has personally investigated every case of bubonic plague^a that has occurred in the Provinces. His numerous other duties may not allow of his continuing to do so, but he will exercise general control over all the preventive and precautionary measures detailed in the rules annexed. He should be immediately consulted in all cases of difficulty or doubt by Civil Surgeons, who are primarily and directly responsible for the entire medical and sanitary arrangements, or by district officers; and any instructions issued by him should be promptly carried out.

Orders under
the Epidemic
Diseases Act.

15. Special attention is directed to the regulations and orders made by this Government under Act No. III of 1897, which form an Appendix to this Resolution, and which will remain in force until further orders. Copies of these rules, and translations into the vernacular, will be furnished to district officers for affixing to notice-boards at railway stations and in municipal towns and cantonments, and for distribution to the officials concerned. The Lieutenant-Governor and Chief Commissioner trusts that the period during which it is necessary to enforce such orders in the interests of the inhabitants of these Provinces will not be long; but His Honour has no doubt that in view of the gravity of the situation the orders will be cheerfully obeyed by all classes of the community.

ANNEXURE A.

Notification No. ³⁵~~XVI-404-B~~ of 1879 dated the 12th February 1897. No. 45.

Preamble.

In exercise of the power conferred on this Government by Notification No. 302, dated 4th February 1897, of the Governor-General in Council, the Lieutenant-Governor of the North-Western Provinces and Chief Commissioner of Oudh is pleased to make the following

regulations and orders under Act No. III of 1897 (an Act to provide for the better prevention of the spread of Dangerous Epidemic Disease):—

Regulations and orders made by the Local Government under Act No. III of 1897 for the detection and treatment of cases of bubonic plague, with a view to the better prevention of the spread of that disease.

Part I.—Rules relating to villages and small towns.

(i) Duties of the Police.

1. The officer in charge of every police station shall forthwith bring upon a list (A) the names of all villages in his circle the inhabitants, or any portion of the inhabitants of which, are ascertained to have trade relations or other connection with the Bombay Presidency or Kurrachee. List A of villages having communication with the Bombay Presidency.

2. Every village policeman shall enquire and report without delay the name of every person in his village who has arrived from the direction of Bombay or Kurrachee since the 1st of January 1897: he will also report all fresh arrivals as they occur. The names so reported will be entered on a list (B). Report of arrivals from the Bombay Presidency (List B).

3. In the case of every village entered in list A, reports of all deaths shall be made daily, as in the case of cholera epidemics: and the officer in charge of the police station, on receiving report of a death, shall carefully enquire whether the deceased person had symptoms of bubonic plague as described in Annexure I. Reports of deaths in villages in List A.

4. Similar inquiry shall be made in the event of a report being received of the death of any person whose name is entered in list B or of any person in that household. Reports of deaths of persons in List B.

5. Whenever the deaths reported from any village (whether on list A or B or not) are more frequent than usual, and especially sudden deaths attributed to fever, the officer in charge of the police station shall make inquiries from the village policemen with a view to ascertaining whether the symptoms of bubonic plague existed. Reports of unusual mortality in any village.

6. On ascertaining from a village policeman or other source of information that a death in a village was preceded by symptoms such as those described in Annexure I, the officer in charge of the police station will either go himself or depute a competent subordinate to make an inquiry, any action taken being recorded in the station diary. Enquiry into suspicious deaths.

7. If the officer making the inquiry is of opinion that the death was due to bubonic plague, and finds that no other persons in the house in which the death occurred are ill, he shall proceed to dispose of the body and to disinfect the house, clothes and bedding of the deceased, Disposal of body and disinfection of house, clothing, bedding, etc.

as laid down in Annexure I, *reporting at the same time the result of

* Printed after the his inquiry in the manner provided in Rule 9.
later Resolution 7, of
the 26th March.

Precautions to
be taken with the
sick.

8. If he also finds that any person in the house is ill with fever, he shall, in the absence of the Tahsildar and in anticipation of orders from the Civil Surgeon or Magistrate, see that all the precautions specified in Annexure I, are, with the assistance of the headman of the village, rigorously observed. He will take similar action on learning of the occurrence of a case of bubonic plague at any way-side railway station in his circle.

Report to Dis-
trict authorities.

9. The officer in charge of the police station shall report immediately to the District Superintendent of Police, the Magistrate of the District, the nearest Medical Subordinate and the Civil Surgeon, any case of bubonic plague, or suspicious case, brought to his notice. The Civil Surgeon will inform the Inspector General of Civil Hospitals and the Sanitary Commissioner by telegram.

(ii) Duties of the Revenue Staff.

Reports.

10. Every patwari shall report to the Registrar Kanungo and the Tahsildar the death of any person in his village in cases where the symptoms of bubonic plague, as described in Annexure I, were present.

Enquiry by
Tahsildar.

11. On receipt of such report, the Tahsildar shall satisfy himself that the necessary action, described in the preceding rules, has been taken by the police.

Tahsildar to
assist.

12. If possible, the Tahsildar shall go himself to the spot or depute his Naib or ask a relief officer to assist in enforcing the sanitary precautions.

Report to
Magistrate.

13. The Tahsildar shall communicate the information forthwith to the District or Sub-divisional Magistrate.

(iii) Duties of the Famine Relief Staff.

Enquiry by Relief
Officers and en-
forcement of
precautions.

14. Every Relief Officer on his rounds shall ascertain whether any case of bubonic plague has occurred in the village visited; and if any come to his notice, shall cause the village policeman to report it, and proceed himself to take the sanitary precautions named in Annexure I, if the necessary action has not already been taken.

(iv) Duties of the Medical Staff.

Visit by medical
officer and
report to Civil
Surgeon.

15. The nearest medical officer to receive information of cases of bubonic plague from the officer in charge of a police station may be the Hospital Assistant of a Branch Dispensary. The Hospital Assistant,

on receiving a report of a case, shall (if possible) at once visit the spot and see that the necessary sanitary measures are taken. He shall communicate the result forthwith to the Civil Surgeon.

• 16. In villages in which a Branch Dispensary is situated, Hospital Assistants shall themselves watch all arrivals and report sickness, with a description of the symptoms, to the Civil Surgeon of the district. Hospital Assistants to watch arrivals and report sickness.

17. Civil Surgeons will arrange to proceed, as soon as possible, to places from which cases are reported, or to depute a qualified subordinate to undertake the duty in their place. On arrival, the Civil Surgeon (or qualified subordinate) shall be guided in his action by the instructions conveyed in rules 27 to 37, so far as they are applicable to the circumstances of the case. Civil Surgeon or subordinate to visit places whence cases are reported and to enforce precautions.

18. Should the Civil Surgeon consider it necessary that the inhabitants of a village in which bubonic plague has broken out should temporarily camp out in the open or under trees at a distance from the village in the manner indicated in rule 34, he may make a report to that effect to the Magistrate of the District, and the latter may direct the inhabitants to vacate their houses accordingly. The houses shall in this case be not again occupied till they are thoroughly disinfected. Temporary encampment in the open.

(v) *Duties of the Public.*

19. Every person to whom an order is given by any officer empowered to act under the preceding rules, with regard to his segregation, the disinfection of his house or personal property, the disposal of a dead body, or with regard to any other matter falling under these rules shall duly obey that order. The public to obey instructions.

Part II.—Rules relating to Municipalities, Cantonments, and Towns under Act XX of 1856.

20. The foregoing rules shall be observed, so far as possible, in municipalities, cantonments, and in towns administered under Act XX of 1856. Foregoing rules to apply to municipalities, cantonments and other towns.

21. The following special rules shall apply to every municipality constituted under Act XV of 1873 or Act XV of 1883 and to every cantonment. Following special rules apply.

“21-A. Every occupier of a ‘factory’ shall on employing in his factory any person who has come from the Bombay Presidency or Sind, immediately give notice in writing of the fact of such employment to the Magistrate of the district, and shall report to the Magistrate the name and address of the person employed. Notice to be given of employment in factories of persons from the Bombay Presidency.

Notification No. 120
XVI-1856, dated
the 4th March
1897.

"The word 'factory' used in this rule means any premises wherein is carried on any process for, or incidental to, making, altering, repairing, ornamenting, finishing or otherwise adapting for use or sale any article or part of an article; and wherein steam, water or other mechanical power is used in aid of any such process."

Report by householders, etc.

22. If in any house a person becomes ill, or dies of a disease which is known, or suspected to be, bubonic plague, the owner of such house, or if the owner be non-resident, the occupier, and every head of a family resident therein, shall forthwith report the occurrence of such illness or death at the nearest police station.

Report by householders, etc., of illness or death of persons from the Bombay Presidency.

23. If there is, or has been, resident in any house a person who has come since the 1st January 1897 from Bombay, Poona, Karachi, or other place in which bubonic plague is prevalent, the owner of such house or, if the owner be non-resident, the occupier, and every head of a family resident therein, shall report at the nearest police station—(1) the illness of any person in such house, or (2) the death of any person in such house, immediately such illness is apparent or death occurs.

Report by medical practitioners.

24. Any medical practitioner who (1) attends a case of illness in a house in which there is present a person who has come from a place where plague is prevalent, or who (2) attends in any house a case in which he has reason to believe the sick person to be infected with bubonic plague, shall forthwith report such illness to the nearest police station.

Report to authorities by the police.

25. On receiving a report under rules 22, 23 or 24, the officer in charge of the police station shall immediately report the matter to the District Superintendent of Police, the District Magistrate and the Health Officer (or Sanitary Officer) of the municipality or cantonment.

Removal of the sick and removal and disposal of corpses.

26. In the cases referred to in rules 22, 23 and 24 a sick person or dead body shall not be removed from the house without the written permission of the Health Officer: and the head of the family shall dispose of a dead body by cremation or burial in such manner as may be directed by the Health Officer.

Disinfection and cleansing of houses, disinfection or destruction of clothing, bedding, etc., disposal of corpses, sanitary improvements.

27. The owner and occupier of a house, and the head of any family resident therein, shall comply with any direction that may be issued by the Health Officer or Officer of the Sanitation Department with regard to the disinfection and cleansing of a house, the disinfection or destruction of clothing and personal effects, the disposal of any corpse, the improvement of the sanitary condition of the premises, and

Notification No.

XVI—404-B.—105,
dated the 26th
February 1897.

with regard to other similar matters, and shall permit the Health Officer or officer of the Sanitation Department to enter his house or premises for the purpose of inspection.

28. The Health Officer shall, if he considers it necessary, himself take measures for the disinfection of a house and for the other matters referred to in the preceding rule.

Health Officer may himself take measures for the above.

Should the Health Officer think it necessary and practicable to burn or otherwise destroy any non-masonry and inflammable structure, he will report the case to the Magistrate of the District and act on his orders. The Magistrate of the District may order the burning or destruction of any hut or other temporary structure, if disinfection cannot be satisfactorily effected.

Destruction of non-masonry structures.

29. The owner and occupier of any house shall permit the Health Officer to enter his premises and examine any person whom the Health Officer has reason to believe to be infected with bubonic plague. If the person be a female, the examination shall, if desired, be made through a female doctor, female Hospital Assistant or other female agency.

Entry and examination of persons. Females.

30. If on examination of a sick person in a house or other place within the limits of a municipality or cantonment, the Health Officer suspects (1) that such person is infected with bubonic plague, or (2) considers that he is actually suffering from bubonic plague, the Health Officer shall, if he considers it necessary, arrange for the removal of such person, (1) to an observation shed, or (2) to a temporary hospital established for the purpose and for his detention, dieting and medical treatment therein; also for the removal of the other occupants of the house to segregation huts, tents, or suitable structures constructed at a distance from the town, to be detained under observation for ten days.

Removal of patients to hospital or temporary accommodation. Segregation of other occupants of the house.

31. If in any case a person removed to a temporary hospital is accompanied by a companion or attendant, the Health Officer shall require the companion or attendant to live in the immediate neighbourhood of the temporary hospital in a segregation hut or tent provided for the purpose, and to remain in such place until he receives permission from the Health Officer to depart.

Companions and attendants of the sick.

32. If a person is attacked with bubonic plague while so segregated, the Health Officer shall remove such person to the temporary hospital, and shall keep under observation in a segregation hut, tent or suitable structure, for a period of ten days from the date of such removal, any companion or attendant who has been with the person attacked.

Segregation of the same if attacked by plague.

33. Upon the death of a sick person from bubonic plague, the Health Officer shall for ten days detain under observation all persons who have been in attendance upon him, in segregation huts, tents or suitable structures established for the purpose in the neighbourhood,

Segregation for 10 days of persons in attendance on deceased.

Evacuation of
infected locality.

34. If bubonic plague has become prevalent in a portion of a municipality or cantonment, the Health Officer or Sanitary Commissioner may, with the sanction of Government, direct the inhabitants of any street, mahalla or other locality to evacuate their houses, to remove to a temporary settlement established, as a place of segregation, at a distance from the infected quarter, and to remain in such settlement for so long as he may consider necessary. After evacuation, the Health Officer shall arrange for the thorough disinfection and cleansing of the empty premises, and shall not permit the inhabitants to return until the premises are considered to be free from infection.

Persons dealt
with under fore-
going rules to
obey instruc-
tions.

35. A person dealt with under the foregoing rules shall comply with any directions that may be given to him by the Health Officer, with regard to his removal to, and his detention and treatment in, an observation shed, temporary hospital or place of segregation, and with respect to the disinfecting or burning of his clothing and personal effects, the disposal of any corpse, or with respect to any other similar matter; he shall not depart from any such place of detention without the permission of the Health Officer.

Disposal of
corpses.

36. In the event of death occurring from bubonic plague, the Health Officer shall arrange for the disposal of the body. In the case of a European or Muhammadan, the body shall be buried at least six feet deep and be covered with chloride of lime: the place of burial if not an authorized cemetery, should be well away from habitations and sources of water-supply. In the case of a Hindu, the body shall be completely and thoroughly burned in an isolated locality in the presence of a responsible official.

Assistance of
Police.

37. All police officers shall give to the Health Officer such assistance as he may consider necessary in carrying out these rules.

Part III.—Rules relating to Railway Stations.

(i) Procedure at Manikpur, Jhansi, Saharanpur, and Ghaziabad.

A.—Inspection of Passengers.

Definition.

38. In the following rules the words "Medical officer" mean the Commissioned Medical Officer, Military Assistant Surgeon or officer of the rank of Civil Surgeon stationed at Manikpur, Jhansi, Saharanpur and Ghaziabad, and at any other place which may be subsequently notified, for the purpose of carrying out these regulations.

Detention of
trains at
Manikpur,
Jhansi,

39. Every train coming from the direction of Bombay in the case of Manikpur and Jhansi, and of the Punjab in the case of Saharanpur and Ghaziabad, shall be detained at those stations to

long as may be necessary for the medical examination of the passengers. The railway authorities shall detain the train so long as the medical officer may consider necessary for the purpose. Saharanpur and Ghaziabad.

40. On the arrival of the train at these stations, a passenger shall not alight from the train without the permission of a railway police, or medical official. Passengers not to alight without permission.

41. Every passenger shall, on being requested to do so by any railway police or medical official, alight from the train, and proceed for the purpose of medical inspection to any spot that may be indicated by such official. Passengers to alight and proceed to spot indicated for inspection.

42. A passenger shall not depart from the spot so indicated without the permission of the Medical Officer. Passenger to remain until allowed to go.

43. The examination of females shall be effected under the orders of the Medical Officer by a female medical practitioner or female medical subordinate. Examination of females.

B.—Segregation of Passengers.

44. If on inspection and examination of a passenger, the Medical Officer has reasonable ground for suspecting that he or she is infected with bubonic plague, the Medical Officer shall remove such person to the observation shed erected in the vicinity of the railway station, and shall arrange for the detention, dieting and medical treatment of such person in the observation shed for so long as he (the Medical Officer) may consider necessary. Detention of suspect passengers.

45. If on inspection and after due observation the Medical Officer is satisfied that a passenger is suffering from bubonic plague, the Medical Officer shall immediately remove such person to the temporary hospital established for the purpose, and shall arrange for the detention, dieting and medical treatment of such person therein for so long as he (the Medical Officer) may consider necessary. Detention of plague cases in hospitals.

46. If in any case a person removed to a temporary hospital is accompanied by a companion or attendant, the Medical Officer shall require such companion or attendant to live in the immediate neighbourhood of the temporary hospital in a segregation hut or tent provided for the purpose, and to remain in such place until he receives permission from the Medical Officer to depart. Segregation of companions and attendants.

47. If a person is attacked with bubonic plague while so segregated, the Medical Officer shall remove such person to the temporary hospital and shall keep under observation in a segregation hut, tent, or suitable structure, for a period of ten days from the date of such removal, any companion or attendant who has been with him. Treatment of the same if attacked by plague.

Segregation for ten days of attendants of deceased. 48. Upon the death of the sick person, the Medical Officer shall for ten days detain under observation all persons who have been in attendance on him, in segregation huts, tents or suitable structures established for the purpose in the neighbourhood.

Persons dealt with under foregoing rules to obey instructions. 49. A person dealt with under the foregoing rules shall comply with any directions that may be given to him by the Medical Officer with regard to his removal to, and his detention and treatment in, an observation shed, temporary hospital or place of segregation, and with respect to the disinfecting or burning of his personal effects, the disposal of any corpse, or with respect to any other similar matter: he shall not depart from any such place of detention without the permission of the Medical Officer.

Disinfection or destruction of clothing, bedding, etc. Compensation. 50. If necessary, the Medical Officer shall himself arrange for the disinfection or destruction of clothes, etc. In cases where it is considered necessary that the clothes or bedding, etc., of a traveller should be burnt, the Medical Officer may, if the person is poor or for other sufficient reason, arrange for providing other articles in their place at the expense of Government.

Report to Civil Surgeon, District Magistrate and Medical Inspector. 51. The Medical Officer shall immediately report by telegraph to the Civil Surgeon, the Magistrate of the District and the Medical Inspector the case of any person removed under his order to an observation shed, temporary hospital or place of segregation, and the occurrence of any death, or the discovery of a dead body in a train or on railway premises.

C.—Disposal of Corpses.

Method of disposing of corpses. 52. In the event of a death occurring in a case where the existence of bubonic plague was known or suspected, or of a corpse being found in a train, the Medical Officer shall arrange for the disposal of the body. In the case of a European or Muhammadan, the body shall be buried at least six feet deep and be covered with chloride of lime: the place of burial, if not an authorised cemetery, should be well away from habitation and sources of water-supply. In the case of a Hindu, the body shall be completely and thoroughly burnt in an isolated locality in the presence of a responsible official.

D.—Relations of Medical, Police and Railway Officials.

Medical Officer at inspection station and Civil Surgeon to keep in communication. 53. In carrying out the foregoing instructions, the Medical Officer shall keep in communication with the Civil Surgeon, and the latter shall give the Medical Officer assistance in all cases in which he may require it.

Assistance of railway and police authorities. 54. The railway police and railway authorities shall assist the Medical Officer in carrying out these rules.

(ii) *Procedure at Agra, Allahabad, Benares, Cawnpore, Lucknow, Moghal Sarai, and Muttra.*

A.—Inspection of Passengers.

55. A Hospital Assistant has been placed at the railway stations noted on the margin, whose sole duty is to watch the trains coming from the direction of places infected with bubonic plague and to observe the passengers who alight or change trains at the stations.

Agra.
Allahabad.
Benares.
Cawnpore.
Lucknow.
Meerut City.*
Moghal Sarai.
Muttra.

*Notification No. 87

XVI—404-B.—1021,
dated the 26th Feb-
ruary 1907.

56. The railway authorities shall allow sufficient time for the observation (a) of passengers who alight, and (b) of passengers who change carriages

Inspection car-
ried out by Hos-
pital Assistant.

Railway author-
ities to make
arrangements for
inspection.

for the purpose of proceeding by other trains, and shall make such arrangements as may be necessary for the purpose.

57. If the Hospital Assistant suspects a passenger to be suffering from bubonic plague, he shall immediately arrange for the removal of such person to the observation shed in the vicinity of the railway station, and for his detention and treatment therein pending the arrival of the Civil Surgeon. The Hospital Assistant shall report his action forthwith to the Civil Surgeon and the Magistrate of the district.

Suspect cases
to be removed to
segregation shed
and report made
to District au-
thorities.

B.—Segregation of Passengers.

58. On receiving a report under the preceding rule, the Civil Surgeon (or the officer in charge of his duties) shall at once proceed to the observation shed, and shall arrange, if in his opinion the circumstances of the case require it, for the detention, dieting and medical treatment of the person infected, or suspected of being infected, with bubonic plague; and for the removal, if necessary, of such person from the observation shed to the temporary hospital for detention and medical treatment therein.

Civil Surgeon
to arrange for
treatment and
segregation.

59. If in any case a person removed to a temporary hospital is accompanied by a companion or attendant, the Civil Surgeon shall require the companion or attendant to live in the immediate neighbourhood of the temporary hospital in a segregation hut or tent provided for the purpose, and to remain in such place until he receives permission from the Civil Surgeon to depart.

Segregation of
companions and
attendants.

60. If a person is attacked with bubonic plague while so segregated, the Civil Surgeon shall remove such person to the temporary hospital, and shall keep, under observation for a period of ten days from the date of such removal, in a segregation hut, tent or suitable structure, any companion or attendant who has been with him.

Treatment of
the same if at-
tacked by plague.

Detention for
ten days of atten-
dants of deceased.

61. Upon the death of the sick person, the Civil Surgeon shall for ten days detain under observation all persons who have been in attendance on him in segregation huts, tents or suitable structures established for the purpose in the neighbourhood.

Persons dealt
with under
foregoing rules
to obey
instructions.

62. A person dealt with under the foregoing rules shall comply with any direction that may be given to him by any officer empowered under these rules, with regard to his removal to, and his detention and treatment in, an observation shed, temporary hospital or place of segregation, and with respect to the disinfection or burning of his clothes and personal effects, the disposal of any corpse or with respect to any other similar matter, he shall not depart from any such place of detention without the permission of the Civil Surgeon.

Disinfection or
destruction of
clothing,
bedding, etc.
Compensation.

63. If necessary, the Civil Surgeon shall himself arrange for the disinfection or destruction of clothes, etc., in cases where it is considered necessary that the clothes or bedding, etc., of a traveller should be burnt, the Medical Officer may, if the person is poor or for other sufficient reason, arrange for providing other articles in their place at the expense of Government.

Report to the
District
Magistrate.

64. The Civil Surgeon shall immediately report to the Magistrate of the district the case of any person removed under his order to a temporary hospital or place of segregation and the occurrence of any death in the case of a person believed to be infected with bubonic plague.

C.—Disposal of Corpses.

Method of
disposal of
corpses.

65. In the event of a death occurring from bubonic plague, or of a corpse being found in the train, the Civil Surgeon shall arrange for the disposal of the body. In the case of a European or Muhammadan, the body shall be buried at least six feet deep and be covered with chloride of lime: the place of burial, if not an authorized cemetery, should be well away from habitations and sources of water-supply. In the case of a Hindu, the body shall be completely and thoroughly burnt in an isolated locality in the presence of a responsible official.

D.—Duty of Railway Police and Railway Authorities.

Assistance of
railway and
police
authorities.

66. The railway police and railway authorities shall assist the Civil Surgeon or other official in carrying out these rules.

(iii) Procedure at Stations other than those detailed under (i) and (ii).

Station masters
and other
railway officials
to watch
passengers.

67. At all stations, the Station Master and other railway officials should watch persons who alight from the trains, more especially those who have travelled from the direction of Bombay or other places where plague is prevalent, with the view of detecting cases of bubonic plague.

68. At the stations noted in the margin, officers of the vaccination department have been posted to assist the Station Masters in watching passengers: and arrangements have been made for the erection of observation sheds, temporary hospitals and segregation structures. If at any of these stations a person travelling from the direction of Bombay or other infected place is undoubtedly suffering from bubonic plague, the Station Master, with the assistance, if necessary, of the police, shall arrange for his removal from the train or railway premises to the observation shed, and for his temporary detention therein until he can be inspected by a Medical Officer. Any person desiring to accompany the sufferer shall be permitted to do so. The Station Master shall immediately report the matter to the nearest Civil Surgeon, the nearest District Magistrate, the Medical Inspector and the Sanitary Commissioner. Stations at which officers of the Vaccination Department are posted. Segregation of suspect cases. Report to district authorities.

Aligarh.	Jaunpur.
Banda.	Lalitpur.
Bareilly.	Lakhimpur.
Bahraich.	Mirzapur.
Bara-Banki.	Moradabad.
Chandauli.	Muttra.
Etawah.	Muzaffarnagar.
Farukhabad.	Orai.
Fatehpur.	Pilibhit.
Fyzabad.	Rampur.
Ghaziपुर.	Rae Bareli.
Gonda.	Roorkee.
Gorakhpur.	Sitapur.
Hardoi.	Shahjahanpur.
Hardwar.	Tundla.
Hathras.	Unao.

69. At other wayside stations, such persons if booked through, may be permitted to proceed to the nearest station at which a temporary hospital has been provided, the Station Master telegraphing to such station the details of the case, the name of the sick person, and the number of the carriage. If such persons alight at the wayside station, they should be removed by the railway or police officials to some isolated place, and the fact should be reported forthwith by the Station Master to the officer in charge of the nearest police station (*vide* rule 8), as well as to the authorities mentioned in the preceding rule. Other wayside stations. Despatch of suspect cases to nearest station where there is accommodation.

70. The Civil Surgeon on receiving a report under rule 68 or 69 will proceed to the spot (or depute a competent subordinate) to take action, so far as may be necessary or possible, in accordance with the provisions of rules 58 to 65; the railway police and railway authorities shall give him all assistance required. Civil Surgeon to take necessary action.

71. A person dealt with under the foregoing rules shall comply with any direction that may be given to him by any officer empowered under these rules with regard to his removal to, or his detention and treatment in, an observation shed, temporary hospital or place of segregation, and with respect to the disinfection or burning of his clothes and personal effects, the disposal of any corpse, or with respect to any other similar matter, he shall not depart from any such place of detention without the permission of the Civil Surgeon. Persons dealt with under foregoing rules to obey instructions.

(iv) Duties of Medical Inspectors.

Appointment of travelling inspectors.

72. The following officers have been placed on special duty as travelling Inspectors in connection with these regulations within the limits of the North-Western Provinces and Oudh:—

[Rank of Officer.	Head-quarters.	CIRCLE OF INSPECTION.	
		Principal railway stations.	Extent of railway line.
Assistant Surgeon ...	Ghaziabad ...	Bareilly, Meerut ...	<ol style="list-style-type: none"> 1. O. & R. Railway between Saharanpur, Hardwar, Aligarh and Lucknow. 2. N.-W. Ry. between Saharanpur and Ghaziabad. 3. R. & K. Ry., Lucknow-Bareilly Section and Bareilly-Kathgodam Section.
Civil Medical Officer	Cawnpore ...	Agra, Cawnpore, Lucknow, Muttra.	<ol style="list-style-type: none"> 1. E. I. Ry. between Ghaziabad and Allahabad. 2. B. B. & C. I. Ry. between Cawnpore, Muttra and Agra. 3. I. M. R. between Cawnpore, Lalitpur and Agra, and from Jhansi to Manikpur. 4. O. & R. Ry. between Cawnpore and Lucknow.
Assistant Surgeon ...	Allahabad ...	Allahabad, Benares, Moghal Sarai.	<ol style="list-style-type: none"> 1. E. I. Ry. between Allahabad and Buxar; also between Allahabad and Manikpur. 2. O. & R. Ry. between Moghal Sarai and Lucknow; also Rae Bareilly and Bahramghat Sections. 3. B. & N.-W. Ry.

Inspection duties. 73. Each Medical Inspector shall travel frequently over the lines of railway included in his circle, and shall make surprise visits at least once a week to the principal stations. He shall examine the method adopted for inspection of passengers, and the arrangements made for the provision of observation sheds, temporary hospitals and segregation huts or tents. He will ascertain that all orders are being properly carried out, and that the prescribed duties are being performed.

74. A Medical Inspector shall keep a register showing dates of visits (with time of arrival and departure) to each station, a copy of which shall be forwarded weekly to the Sanitary Commissioner. Register of inspection visits

75. The Medical Inspector will receive from all subordinates and from the railway authorities telegraphic information of the occurrence of a case, or suspected case, of bubonic plague, or of the discovery of a dead body in the train or on railway premises. Telegraphic information of cases to the Inspector.

76. The Medical Inspectors will be directly subordinate to the Sanitary Commissioner. They should communicate freely and without delay with Civil Surgeons on all points requiring action, and should report to them any defects in the arrangements or shortcomings on the part of subordinates, forwarding at the same time a copy of the report to the Sanitary Commissioner for information. Medical Inspectors directly subordinate to Sanitary Commissioner.

(v) *General Rules.*

77. No certificates as to the nature of an illness or the cause of a death shall be given in any case dealt with under these rules by any medical officer of lower rank than Assistant Surgeon. Certificates of cause of illness and deaths.

78. The railway police shall arrange for the immediate removal on a *charpoy* of any dead body found at, or in the vicinity of, a station, and for its detention, together with those accompanying it, until it has been inspected by a Medical Officer. Treatment of dead bodies found in or near railway stations.

79. At stations where a temporary hospital has been erected, the body shall be taken to the hospital: at other places, it shall be placed in an isolated place at a suitable distance from the station. The matter shall be immediately reported by the railway police to the District Magistrate and Civil Surgeon for orders. Temporary disposal of body.

80. On receipt of information, the Civil Surgeon (or officer in charge of his duties) shall (unless the case occurs at Manikpur, Jhansi, Saharanpur or Ghaziabad where special Medical Officers are posted) at once proceed to the spot, the Magistrate deputing a responsible official to accompany him and to carry out his directions. Civil Surgeon to proceed to the spot.

81. In cases where death from plague is indicated, the Civil Surgeon will arrange for the immediate cremation or burial of the corpse in the manner prescribed in rule 65 and for the isolation, if necessary, of those accompanying it, as provided in rule 61, together with such other measures as may be considered necessary by him. Disposal of plague corpses.

81-A. Rules 78—81 apply to places where a Civil Surgeon is stationed. At other places, in the case of bodies not claimed by friends, the railway police will be guided by paragraph 344 of the Police Regulations and Orders, and by the instructions in Annexure I: if there are friends accompanying the body, they shall, under the direction of the railway police, dispose of the corpse in the manner indicated in Annexure I. The Procedure at places where there is no Civil Surgeon.

names and addresses of such friends shall be taken by the railway police, and shall be forwarded immediately to the Magistrate of the district in which the body was found, as well as to the Magistrate of the district in which they live, it being specially reported whether they came from the direction of Bombay (or other place in which bubonic plague is prevalent) or not. At stations where there are no railway police, the railway authorities shall report the finding of a dead body immediately to the nearest district police station (as well as to the nearest railway police station), and the officer in charge of the district police station or his subordinate shall at once proceed to the spot and take action as prescribed above for the railway police.

Report to Sanitary Commissioner and Government.

82. The railway authorities shall telegraph intelligence of the occurrence of every case of plague or suspected plague to the Sanitary Commissioner, Lucknow, as is at present done with regard to cholera cases. The Sanitary Commissioner will immediately inform the Government of any reported case of plague, whether occurring on the railway line or elsewhere.

82-A. When any through carriage from the Bombay Presidency Notification No. ¹²⁹ XVI-404-B, dated is detached from a train at any railway station in the North-Western Provinces and Oudh, it shall be disinfected or ventilated in the following manner as soon as possible, and before it is again brought into use:—

Third and intermediate class carriages—

Disinfection of railway carriages.

The interior woodwork of the carriages, especially the floors and seats, should be thoroughly washed with solution of a perchloride of mercury (1 in 1,000) or with a carbolic acid solution (a wine glassful to a gallon): the doors and windows should be opened, and the vehicle exposed to the air.

First and second class carriages—

The floors and wood work should be treated as above, the cushions being also brushed and thoroughly cleaned.

Recording and report to District Magistrate of names and addresses of travellers from the Bombay Presidency.

83. Every* passenger who alights at the stations noted on the margin, having come from a place in the Bombay Presidency or Sind, shall give his name and address to the railway or police or medical or other official on duty at the railway station for the inspection or examination of passengers. It shall be the duty of such

Manikpur.	Saharanpur.
Jhansi.	Ghaziabad.

* Notification No. ⁹⁰ XVI-404-103, dated 26th February 1897.

official to demand and record the names and addresses of such passengers as aforesaid. The officer who records the names and addresses shall forward them for information and for entry in list B (*vide* rule 2) to the Magistrate of the district to which the traveller is proceeding.

Agra.
Allahabad.
Benares.
Cawnpore.

| Lucknow.
Meerut City.
Moghal Sarai.
Muttra.

REVISED GENERAL REGULATIONS.

No. 46.

Notification No. $\frac{211}{XVI-404-B}$, dated the 26th March 1897.

READ :—

Resolution No. $\frac{57}{XVI-404-B}$, dated 12th February 1897, issuing rules under

Act No. III of 1897.

OBSERVATIONS.—Representations have been made to the Lieutenant-Governor and Chief Commissioner that it will conduce to the smoother working of the rules issued under Act No. III of 1897 (an Act to provide for the better prevention of the spread of Dangerous Epidemic Disease) if the procedure to be followed under them is more fully and clearly defined. Accordingly His Honour has again carefully considered the rules with a view to defining the procedure to be followed in giving effect to them and to removing any provisions likely to cause misapprehensions regarding their bearing and scope. In this labour he has received valuable assistance from a committee composed of the undermentioned gentlemen, to whom the rules were submitted for examination, and by whom the rules, as they now stand, have been accepted as necessary and suitable :—

Previous rules reconsidered with a view to define the procedure and to remove provisions likely to cause misapprehension.

R. G. Hardy, Esq., I.C.S., Commissioner of Lucknow.

Surgeon-Major Thomson, Sanitary Commissioner.

Maharaja Sir Partáb Naráyan Singh of Ajudhya, K.C.I.E.

Raja Sir Muhammad Amir Hasan Khán, Khán Bahádúr,

K.C.I.E., Amir-ud-Daula, Saiyid-ul-Mulk, Mumtáz Jang.

Rána Sir Shankar Bakhsh Singh, K.C.I.E.

Nawáb Agha Mehdi Husain Khán, Bahadur.

Nawáb Mumtaz-ud-Daula Faiaz Ali Khán of Pahasu.

Rája Tasadduq Rasúl Khán.

Rája Jagmohan Singh, C.I.E.

Rája Jai Kishan Das, C.S.I.

The Honourable Babu Sri Ram, Rai Bahádúr.

Chaudhri Nasrat Ali, Khán Bahádúr.

Maulvi Sayid Allan Sahib, Mujtahid of the
 Shia sect;
 Maulvi Abdul Majid, Sunni Maulvi;
 Pandit Gangadhar Shastri, of Benares;
 Pandit Gaya Maneshar, of Lucknow;

attended the meeting as expert advisers.

The Lieutenant-Governor and Chief Commissioner has also been assisted in considering the rules by the following influential gentlemen:—

The Rája of Bhadáwar.
 The Rája of Tiloi.
 The Rája of Manda.
 The Rája of Tamkuhi.
 The Rája of Awa.
 Mirza Kamr-ud-din Hyder.

Objects of rules
 to secure early
 information and
 to isolate the
 infected.

2. The first object of the rules is to secure the submission to the sanitary and executive authorities of the earliest information of the occurrence of a case of bubonic plague. The next object is to prevent the spread of the disease by isolating the sick person and his friends and attendants, so that the infection may not be disseminated.

**Association of
 proprietors of
 land with
 Government in
 giving effect to
 rules in villages
 and small towns.**

3. The rules as now published provide, in regard to the first object, for the association of the proprietors of land with the Government in giving effect to the rules in rural villages and small towns. This indeed was always the intention; but it has been thought right to make the intention quite clear in the rules. The responsibility of landlords will in no way lessen the responsibility of the police; but police action under the rules must be taken whenever possible through the landlords and village authorities. It is only when these are supine or refuse to act that independent action by the police will be taken.

**Duties of police
 in municipalities
 and cantonments.**

4. The first object noticed in paragraph 2 above involves also the definition of the duties of the police in municipalities and cantonments. These duties primarily consist in reporting cases of plague which may come to their notice, and carrying out any specific orders which they may receive. It has not been thought desirable to give the police any power of making domiciliary visits, or of their own motion removing the sick to hospitals, or interfering with them in any way; but when, on information received from the police or in the other ways provided for in the rules, the sanitary or executive authorities in a municipality or cantonment decide on segregation or removal to a public or private hospital, then the police may be called on to assist.

5. It has been represented to His Honour that, in isolating persons suffering from, or within the influence of, bubonic plague, hardship are apprehended unless a detailed procedure is prescribed. The following explanations are therefore given. In the revised rules published herewith it will be seen that isolation may be effected either in the residence of the sick person or in a segregation hospital or camp. In this matter the Lieutenant-Governor desires to apply to the native community the same rules which will apply to the European community. If, in the opinion of the sanitary authorities, isolation and segregation can be effectively carried out at the sick person's residence, it will not be necessary to remove such sick person to a hospital or segregation camp; but, if isolation and segregation in the sick person's residence is not, in the opinion of the sanitary authority, practicable, then it is essential that such authority should have the power to direct removal to a segregation camp or hospital established in a suitable situation. This segregation camp or hospital may be a suitable house or hut or collection of huts licensed for the use of a particular family; or a suitable house or collection of huts licensed for the sole use of particular castes or classes of the people; or, lastly, a hospital or collection of huts established for the general use of the public by Government. The Government will, whenever necessary, construct such huts or hospitals, or help private persons to construct them. In designing these huts or hospitals particular care will be taken that the customs of the country regarding the maintenance of *parda* shall be strictly observed, and that those members of the family who wish to accompany the sick person shall be comfortably accommodated, submitting themselves merely to the sanitary precautions which are required by the rules. It is also to be understood that private medical practitioners of all classes must be allowed free access to the sick who desire their attendance, and that it is incumbent upon no one to submit himself to European medical treatment. Each patient may choose freely his own medical attendant.

6. The friends and relatives of persons who have died of plague will be left to dispose of their dead in accordance with their religious customs, subject only to certain sanitary precautions which do not conflict with the mortuary practices of any religion; but, should unfortunately deaths from plague become numerous in any city or town, it may be necessary to establish burial-grounds outside cities or towns for the interment of persons who have died of plague and are not cremated. These burial-grounds can be selected in communication with the heads of the community concerned and made over to them by Government.

Use of quicklime.

7. Exception has been taken to the use of quicklime in burials. The Lieutenant-Governor does not regard the matter as of essential importance. In cemeteries well removed from the inhabited portion of a city and well away from the water-supply the precaution will not be required. In cemeteries situated near habitations the precaution is more necessary. Objections to the use of quicklime seem to be met by a suggestion made to the Lieutenant-Governor by a deputation of the representative Muhammadan citizens of Lucknow, *vis.*, that if used, the lime should not be allowed to come into contact with the coffin (*takhta*) or corpse.

Assistance by all classes of the community.

8. In conclusion the Lieutenant-Governor and Chief Commissioner trusts that the necessity for bringing these rules into widespread and general operation may never arise; but to secure this result the assistance of all classes of the people, on the earliest occurrence of cases of plague, is essentially necessary. If the introduction and spread in these provinces of bubonic plague is to be avoided, all classes of the community must combine to assist the Government by giving the earliest information of any case of bubonic plague which may come to their knowledge and by helping the authorities to carry out the measures now prescribed, which have been designed with the sole object of preventing the introduction and spread of the disease. Experience will show whether these rules meet all requirements, or whether they should be modified or supplemented in any other way.

Notification No. XVI-404-B, dated 26th March 1897.

No. 47.

Preamble.

In exercise of the power conferred on this Government by Notification No. 302, dated 4th February 1897, of the Governor General in Council, the Lieutenant-Governor of the North-Western Provinces and Chief Commissioner of Oudh is pleased to issue the following orders under Act No. III of 1897 (an Act to provide for the better prevention of the spread of Dangerous Epidemic Disease) in supersession of those issued in Parts I and II by Notification No. ⁵⁸XVI-404-B, dated 12th February 1897:—

Part I.—Rules relating to Villages and small towns.

(i) Duties of Proprietors of Land.

Proprietors of land to use best endeavours to secure full compliance with provisions.

1. Every taluqdar, zamindar or other proprietor of land shall use his best endeavours to secure full compliance with the following provisions as to the immediate reporting to the police of the occurrence of each case of plague in his property; as to the segregation of the sick and their attendants; as to the disinfection of the houses of persons who have suffered from plague; and as to the disposal, in

accordance with the customs of their religion, of the bodies of those who have died.

(ii) *Duties of the Police.*

2. (1) The officer in charge of every police station shall forthwith bring upon a list (A) the names of all villages in his circle, the inhabitants or any portion of the inhabitants of which are ascertained to have trade relations or other connection with the Bombay Presidency or Karachi or other place in which bubonic plague is prevalent.

List (A) of villages having communication with infected areas.

Notification No. 384

XVI-404-B, dated the 5th June 1897.

(2) Every village policeman shall enquire and report without delay the name of every person in his village who has arrived from the direction of Bombay or Karachi or other place in which bubonic plague is prevalent since the 1st of January 1897; he will also report all fresh arrivals as they occur. The names so reported will be entered on a list (B).

Report of arrivals from infected areas. (List B).

(3) Every village policeman shall also report any excessive mortality among rats that may come to his notice.

Report of excessive mortality among rats.

3. In the case of every village entered in list A, reports of all deaths shall be made daily, as in the case of cholera epidemics; and the officer in charge of the police station, on receiving report of a death, shall carefully enquire from the person making the report whether the deceased person had symptoms of bubonic plague as described in Annexure I.

Report of deaths in villages in list A.

4. Similar inquiry shall be made in the event of a report being received of the death of any person whose name is entered in list B or of any person in that household.

Report of deaths of persons in list B.

5. Whenever the deaths reported from any village (whether on list A or B or not) are more frequent than usual, and especially sudden deaths attributed to fever, the officer in charge of the police station shall make inquiries with a view to ascertaining whether the symptoms of bubonic plague existed.

Report of unusual mortality in any village.

6. On ascertaining from a village policeman or other source of information that a death in a village was preceded by symptoms such as those described in Annexure I, the officer in charge of the police station will either go himself or depute a competent subordinate to make an inquiry, any action taken being recorded in the station diary.

Enquiry into suspicious deaths.

7. If the officer making the inquiry is of opinion that the death was due to bubonic plague, and finds that no other persons in the house in which the death occurred are ill, he shall direct the relatives or friends of the deceased to dispose of the body (if this has not already been done) and to disinfect the house, clothes and bedding of the deceased, as laid down in Annexure I, reporting at the same time the result of his inquiry in the manner provided in rule 10.

Disposal of body and disinfection of clothing, bedding, etc.

8. (1) If he also finds that, in a house in which a person has died of bubonic plague, any person is ill with symptoms of the

Procedure where there is a sick person in a

house in which
plague cases have
occurred.

disease, he shall, in the absence of the Tahsildar and in anticipation of orders from the Civil Surgeon or Magistrate, see that all the precautions specified in Annexure I are rigorously observed. He will take similar action on learning of the occurrence of a case of bubonic plague at any wayside railway station in his circle.

(2) If in the opinion of the headman and two other respectable residents of the village a person in any other house, (*i.e.*, in any house in which a death from plague has not occurred) is ill with bubonic plague, the precautions specified in Annexure I should also be adopted in that case.

Police officer to
work through
the village
headman and
landlord.

9. In carrying out these instructions the police officer shall work as much as possible through the headman of the village and the landlord; and, so long as the prescribed instructions are obeyed, allow the people themselves to carry them out in accordance with their customs and practices.

Report to
district
authorities.

10. The officer in charge of the police station shall report immediately to the District Superintendent of Police, the Magistrate of the District, the nearest medical subordinate and the Civil Surgeon, any case of bubonic plague, or suspicious case, brought to his notice. The Civil Surgeon will inform the Inspector-General of Civil Hospitals and the Sanitary Commissioner by telegram.

(iii) Duties of the Revenue Staff.

Report.

11. Every patwari shall report to the registrar, kanungo and the Tahsildar the death of any person in his village in cases where the symptoms of bubonic plague, as described in Annexure I, were present.

Tahsildar, who
is also to assist
in enforcing
precautions.

12. On receipt of such report, the Tahsildar shall satisfy himself that the necessary action, described in the preceding rules, has been taken by the police. If possible, the Tahsildar shall go himself to the spot or depute his Naib or ask a Relief Officer to assist in enforcing the sanitary precautions.

Report to
Magistrate.

13. The Tahsildar shall communicate the information forthwith to the District or Sub-divisional Magistrate.

(iv) Duties of the Famine Relief Staff.

Enquiry by
Hospital
Assistants to
watch arrivals
and report
sickness.

14. Every Relief Officer on his rounds shall visit the spot and see that the necessary sanitary measures are taken. He shall communicate the result forthwith to the Civil Surgeon.

(v) Duties of the Medical Staff.

Visit to the spot
by the nearest
Hospital Assist-
ant.

15. The nearest medical officer to receive information of cases of bubonic plague from the officer in charge of a police station may be the Hospital Assistant of a Branch Dispensary. The Hospital Assistant, on receiving a report of a case, shall (if possible) at once visit the spot and see that the necessary sanitary measures are taken. He shall communicate the result forthwith to the Civil Surgeon.

16. In villages in which a Branch Dispensary is situated Hospital Assistants shall themselves watch all arrivals and report sickness, with a description of the symptoms, to the Civil Surgeon of the district.

17. Civil Surgeons will arrange to proceed, as soon as possible, to places from which cases are reported or to depute a qualified subordinate to undertake the duty in their place. On arrival, the Civil Surgeon (or qualified subordinate) shall be guided in his action by the instructions conveyed in rules 31 to 42, so far as they are applicable to the circumstances of the case.

18. Should the Civil Surgeon consider it necessary that the inhabitants of a village in which bubonic plague is prevalent should temporarily be located in *chappars* or other structures in groves or in the open at a distance from the village in the manner indicated in rule 39, he may make a report to that effect to the Magistrate of the District, and the latter may direct the inhabitants to vacate their houses accordingly. The houses shall in this case be not again occupied till they are thoroughly disinfected.

19. Should plague appear in a village, the headmen of surrounding villages should be advised to have no communication with the infected village until the disease has completely disappeared.

(vi) Duties of the public.

20. Every person to whom an order is given by any officer empowered to act under the preceding rules with regard to his segregation, the disinfection of his house or personal property, or with regard to any other matter falling under these rules shall duly obey that order.

Part II.—Rules relating to Municipalities and Cantonments.

21. The foregoing rules, with the exception of rule 1, shall be observed, so far as possible, in municipalities and cantonments, provided that no police officer in a municipality or cantonment shall act under rules 6, 7 and 8 without having previously reported the facts to, and obtained the written orders of, the executive or sanitary authority in such municipality or cantonment. The police officer shall show the written orders to the head of the house if required to do so.

22. The following special rules apply to every municipality constituted under Act No. XV of 1873 or Act No. XV of 1883 and to every cantonment.

23. The words "Health Officer" used in the following rules include a duly authorised Deputy or Assistant Health Officer, a

Medical Officer entrusted with sanitary duties and, in a municipality where there is no resident Sanitary or Health Officer, the Magistrate exercising executive control in the municipality.

Formation of Committees of Residents to assist Health Officer and to explain measure to public and report complaints.

24. In every municipality and cantonment a committee shall be appointed by the Magistrate or cantonment authority for the purpose of assisting the Health Officer in performing his duties under these rules. The Committee should consist of two members, one a Hindu and one a Muhammadan, for each ward of a municipality or definite portion of a cantonment; and their most important duties will be to accompany the Health Officer on his rounds of inspection, to explain the necessity of the sanitary measures, to assist in causing these to be carried out, and to bring to notice any complaints that may be made or abuses that they may discover.

Enforcement of simple sanitary precautions.

25. In any municipality or cantonment the Magistrate of the District or any Magistrate authorised by him in this behalf may issue general orders that by a certain specified date certain sanitary precautions of a simple nature, such as the limewashing of houses, the cleaning of latrines, the removal of filth and rubbish, shall be carried out, and the persons to whom the order is addressed shall comply.

Notice to be given of employment in factories of persons from the Bombay Presidency.

26. Every occupier of a "factory" shall, on employing in his factory any person who has come from the Bombay Presidency or Sind, immediately give notice in writing of the fact of such employment to the Magistrate of the District, and shall report to the Magistrate the name and address of the person employed.

"The word 'factory' used in this rule means any premises wherein is carried on any process for, or incidental to, making, altering, repairing, ornamenting, finishing or otherwise adapting for use or sale any article or part of an article, and wherein steam, water or other mechanical power is used in aid of any such process."

Householders to report plague cases.

27. If in any house a person becomes ill, or dies of bubonic plague, the owner of such house, or, if the owner be non-resident, the occupier, and every head of a family resident therein shall forthwith report the occurrence of such illness or death at the nearest police station.

Householders to report illness or death of persons from the Bombay Presidency.

28. If there is, or has been, resident in any house a person who has come since the 1st January 1897 from Bombay, Poona, Karachi, or other place in which bubonic plague is prevalent, the owner of such house or, if the owner be non-resident, the occupier, and every head of a family resident therein shall report at the nearest police station (1) the illness of any person in such house, or (2) the death of any person in such house, immediately such illness is apparent or death occurs.

29. Any medical practitioner who attends in any house a case which he has reason to believe to be a case of bubonic plague shall forthwith report such illness to the nearest police station.

Medical practitioner to report plague cases.

30. On receiving a report of illness or death from bubonic plague, the officer in charge of the police station shall immediately report the matter to the District Superintendent of Police, the District or City Magistrate and the Health Officer or Sanitary Officer of the municipality or cantonment. Should Assistant Health or Sanitary Officers be appointed for any muhalla or section of the town, the police officer may be directed to report to him instead of the Health Officer. Beyond reporting the fact of illness or death no police officer shall take any action under the rules in this part, except under a written order of the executive or sanitary authority, which he shall be bound to show, if required by the head of the house.

Police officer to report to executive and sanitary authorities and to take no further action without their orders.

31. (1) A person suffering from bubonic plague shall not be removed from the house in which he is at the time lying unless it be for the purpose of removing him to a hospital until after the expiry of six hours from the time a notice of such intended removal shall have been delivered at the nearest police station by, or on behalf of, the friends of the sick person or of the owners or occupiers of the house, unless the Health Officer or other sanitary or executive authority has permitted earlier removal.

Plague patients not to be removed, except to be taken to hospital, until the expiry of a six hours' notice at the police station.

(2) The dead body of a person who has died of bubonic plague shall not be removed from the house in which the death occurred until after the expiry of six hours from the time a notice of such intended removal shall have been delivered at the nearest police station by, or on behalf of, the friends of the deceased or of the owners or occupiers of the house, unless the Health Officer or other sanitary or executive authority has permitted earlier removal.

Similar rule with regard to bodies of persons who have died of plague.

(3) It shall be optional to the person giving the notice to deliver a written notice at the police station, and the station clerk shall record on the notice the time of its receipt and shall sign the same.

Written notice may be given.

(4) The friends of the deceased shall be permitted to dispose of the corpse by cremation or burial in accordance with their religious practices, but they shall obey the directions of the Health Officer or other sanitary or executive authority as to the time, route and method of removing the corpse to the burial or cremation place. In the event of the failure or refusal of relatives or friends of the deceased to dispose of the body, the Health Officer shall dispose of it in accordance with the religion of the deceased.

Friends of deceased permitted to dispose of body in accordance with religious custom, subject to sanitary instructions.

32. The owner and occupier of a house and the head of any family resident therein,* and travellers or others frequenting the town or place,

Householders to obey instructions of Health Officer regarding cleansing, disinfection and other sanitary measures, and to permit Health Officer to enter house.

Apartments occupied by females.

Health Officer may himself carry out sanitary precautions. Destruction of non-masonry structures.

Entry and examination of persons. Females.

Segregation in the house.

Certificate that house has suitable segregation accommodation.

shall comply with any direction that may be issued by the Health Officer or other sanitary or executive authority with regard to the disinfection and cleansing of a house, the disinfection or destruction of bedding, clothing and articles of a similar nature, the improvement of the sanitary condition of the premises, and with regard to other sanitary matters; and shall permit the Health Officer (who should be accompanied, whenever possible, by a member of the committee appointed under rule 24) to enter his house or premises for the purpose of inspection. Provided that, when an apartment is occupied by a female who according to the custom of the country does not appear in public, the Health Officer shall not enter such an apartment without giving notice and affording time to such female to withdraw. In such inspections the Health or Sanitary Officer shall always be accompanied by a male member of the family.

33. The Health Officer shall, if he considers it necessary, himself take measures for the disinfection of a house and for the other matters referred to in the preceding rule. Should the Health Officer think it necessary and practicable to burn or otherwise destroy any non-masonry and inflammable structure, he will report the case to the Magistrate of the District and act on his orders. The Magistrate of the district, or in his absence the Magistrate in charge of his duties, may order the burning or destruction of any hut or other temporary structure, if disinfection cannot be satisfactorily effected otherwise, awarding compensation to persons who are so poor as to be unable to replace at their own expense the structure that has been burnt or destroyed.

34. The owner and occupier of any house shall permit the Health Officer to enter his premises and examine any person whom such Health Officer has reason to believe to be infected with bubonic plague. If the person be a female who, according to the custom of the country, does not appear in public, the examination shall be made through a female doctor, female Hospital Assistant or other female agency.

35. (1) If the Health Officer is satisfied that a person is suffering from bubonic plague in any residence and if, in the opinion of the Health Officer, the residence of the sick person is so situated and possesses such accommodation that the sick person can be properly isolated therein or in the immediate vicinity thereof, such sick person shall not be removed from his residence against the will of the family.

(2) Any resident of a municipality may apply at any time to the Health Officer to inspect his house and to grant (free of charge) a certificate to the effect that the house is so situated and possesses

such accommodation that one or more persons suffering from plague can be properly isolated therein or in the immediate vicinity thereof.

(3) If the sick person's residence does not permit of satisfactory isolation being effected in it, the Health Officer shall, if he thinks it necessary, require the removal of such sick person either to a suitably situated house or temporary hut licensed as a private hospital for the accommodation of the particular individual or of his family or to a hospital licensed for the sole use of particular castes or classes of the community or to a hospital established for the use of the public. The house or building licensed as a hospital should be located as near the residence of the sick person as the Health Officer considers safe.

Segregation in suitable private or caste hospital.

(4) If the Health Officer decides that a person suffering from bubonic plague shall be removed to a private or public hospital, the friends and servants of the person shall be allowed to accompany him, subject to necessary sanitary precautions. The sick person or his friends shall be allowed to employ their own medical attendants and to receive visits from *maulvis*, priests or other religious instructors subject to the sanitary control of the Health Officer and shall be under no obligation to submit to European medical treatment. Separate suitable accommodation shall be provided for females, and, in the case of a female who by the custom of the country does not appear in public, *parda* shall be strictly preserved both in removal to the private or public hospital and during stay there.

Friends and attendants may accompany patient to hospital. Patients may employ their own medical attendants and may receive visits from religious persons.

Accommodation for females.

(5) Should it be necessary to place the family or any of its members under segregation, this will be effected in their own house if, in the Health Officer's opinion, this be possible. If in the Health Officer's opinion this be not possible, then the segregation will be effected in a suitable place which may be chosen by the family and approved by the Health Officer, or in the general segregation camp. In any case strict attention will be paid to the maintenance of the *parda* and the convenience of the family.

Segregation of the family of sick person in own house, special accommodation or general camp.

A member of the family, with the necessary servants, or caretakers, may remain in, or near, the house while under disinfection.

Care of house while under disinfection.

Explanation.—Segregation of a whole family may not always be necessary. It may depend on the number of members in a family or the extent to which they have been in contact with a person suffering from plague. Thus in a family of three members, if one were attacked by plague, it might be necessary to segregate the other two. If there were six members, of whom two only

had been in attendance on the sick person, the segregation of those two only might suffice.

Companions and attendants of the sick.

36. If in any case a person removed to a public or private hospital is accompanied by friends or attendants, the Health Officer may require so many of them as are not in immediate attendance on the patient to live in the immediate neighbourhood of the hospital in segregation huts or tents provided for the purpose and to remain in such place until they receive permission from the Health Officer to depart.

Segregations of the same if attacked by plague.

37. If a person is attacked with bubonic plague while so segregated, the Health Officer shall remove such person to a public or private hospital and may treat his friends and attendants as provided in the preceding rule.

Segregation for 10 days of non-provisional attendants on the sick.

38. Upon the death of a sick person from bubonic plague, the Health Officer shall for ten days detain under observation persons who have been in attendance upon him, in segregation huts, tents or suitable structures established for the purpose in the neighbourhood, if segregation in the house or enclosure be not feasible, provided that this rule shall not apply to any medical practitioner, *hakim* or *baid* who may at any time attend upon a sick person or to corpse-bearers, mourners and friends who have not been in attendance on the deceased.

Evacuation of infected locality.

39. If bubonic plague has become prevalent in a portion of a municipality or cantonment, the Health Officer or Sanitary Commissioner may, with the sanction of Government, direct the inhabitants of any street, muhalla or other locality to evacuate their houses, to remove to a temporary settlement at a distance from the infected quarter. Each householder shall be permitted to make suitable arrangements for the care of his house and property during his absence and the Government will arrange for the watch and ward of the empty houses. After evacuation, the Health Officers shall arrange for the thorough disinfection and cleansing of the empty premises and shall not permit the inhabitants to return until the premises are considered to be free from infection.

Persons dealt with under foregoing rules to obey instructions.

40. A person dealt with under the foregoing rules shall comply with any directions that may be given to him by the Health Officer with regard to his removal to, and residence in, an observation shed, public or private hospital or place of segregation and with respect to disinfecting or burning of bedding, clothing and articles of a similar nature or with respect to any other sanitary matter. He shall not depart from any such place without the permission of the Health Officer.

41. If the place of burial be one set apart by Government as suitable for the interment of corpses of persons who have died of

plague or an ordinary burial place distant from habitations or sources of water-supply, it shall be sufficient to bury the body six feet deep. Disposal of corpses. If the place of burial be a graveyard in which by reason of its proximity to habitations or water-supply special precautions are necessary, the Health Officer may, in addition, require the disinfection of the grave by placing a layer of chloride of lime in the grave. In this case, 2 feet of earth shall be interposed between the lime and the corpse, so that lime shall not come in contact with the corpse. The coffin and cloth used to cover the corpse, when not interred with the corpse, shall be disinfected by the relatives under directions of the Health Officer, such directions being in accordance with the religious observances and customs of the family. In cases where cremation is the custom, the body shall be completely burned at the usual burning ghât or other isolated locality in accordance with custom, the cloths brought in contact with the body being either burnt according to custom or disinfected.

42. All police officers shall give to the Health Officers such assistance as he may consider necessary in carrying out these rules.

Memorandum by the Sanitary Commissioner for the use of Police Officers and others in case of the occurrence of plague in Villages and smaller Towns.

1. The symptoms of plague are fever of recent commencement, violent headache, severe pain in the back and limbs and lassitude. Symptoms of plague. The glands in the groin, or in the armpit or neck, are generally swollen and tender. Cough and pain in the lungs are frequently observed and delirium often comes on early in the disease. Death often occurs in two or three days.

2. The great majority of people attacked by plague die of the disease. The main object therefore should be to keep as far away as possible from people infected with plague.

3. If plague exists in a village the inhabitants of all the surrounding villages should abstain from all dealings with that village till the plague ceases. They should neither go into the infected village nor allow any person from the infected village to come into their village.

4. In like manner in an infected village a family free from the disease should not go near a house in which the disease exists.

5. The best way of preventing the plague from spreading is to segregate the sick person till he recovers or dies; and, as the plague takes ten days to incubate, the attendants on the sick person should be kept apart for at least ten days.

Method of segregation of a person suffering from plague and of his attendants.

6. (1) If the person who is suffering from bubonic plague is living in a large roomy house in which he can occupy a separate room, and if he and his attendants can be kept separate from others in that house, then he should be allowed to remain there.

(2) If the person who is suffering from bubonic plague be living in a hut or such a small house that he cannot be kept separate from others in that house, then he should be removed at once to a small *chappar* hut to be constructed of grass screens and erected well away from habitations. The sites should, if possible, be shady, and near a well. This well should not be used by other people, if there are more than one well in the village. The sick person's relatives and friends may accompany and remain with him, provided that they remain apart and abstain from communication with other people in the village. The village authorities should see that arrangements are made for the supply of food, fuel, etc. Ample accommodation should be provided separately for males, females and families when the house is temporarily abandoned.

7. In all cases, the chief zamíndárs or their agent, the patwári, the village head man and chaukidár should take steps to see that these orders are carried out without interference with the religious or social customs of the family.

8. A "*chappar*" hut, after occupation by a person suffering from plague, should be burnt, and this should also be done to the *chárpaí* upon which the person is carried to, or which he uses in the hut. The well should, if possible, be completely cleaned out and disinfected.

Method of disinfection of houses in which a death from plague has occurred.

9. If the house be a small hut of small value, and this can be done safely, it is best to burn the hut; but, in the case of better houses, the following measures should be adopted:—

(a) The floor of the rooms used by the sick persons should, if of earth, be dug out to a depth of two inches and removed to a spot well away from habitations.

(b) Half a seer of sulphur should be burnt in the room, the doors and windows being closed during the operation.

* Where possible, the sulphur employed for burning in huts and rooms should first be well moistened with methylated spirit. A large wide-mouthed metal vessel containing at least a seer of water should be placed over a slow charcoal fire in the room and the water be allowed to slowly boil away, at the same time that the sulphur is burning. The object is to keep the air moist. Sulphur is recommended for the disinfection of huts and houses,

- because it is cheap and generally procurable. But it should be remembered that a very slight covering protects germs of disease from its action, so that the other measures of disinfection, especially the thorough limewashing of roofs, floors and walls, should be very thoroughly and carefully carried out.
- (c) The roof, floor and walls should be thoroughly limewashed.
- (d) All the drains should be washed down with the best disinfectant available at the nearest dispensary or thana, which will be supplied without payment.
- (e) All doors and windows should be then thrown open and the house vacated for fourteen days.

10. Upon the recovery or the death of a person suffering from plague, the clothes and beddings of the sick person and his attendants should be thoroughly boiled and then spread out in the sun and wind for 48 hours. Clothing and bedding of small value should be burnt. Method of disinfection of clothes and bedding.

The corpse of a person known or suspected to have died from plague should be disposed of by the friends in accordance with the usual customs. In case of cremation the body should be completely burnt in an isolated place. Disposal of bodies.

In case of burial, the body is to be buried at least 6 feet deep. The place of burial should be well away from habitations and sources of water-supply.

No. 48. GOODS ARRIVING FROM UNINFECTED AREAS.

Notification No. ¹⁹⁴XVI-404-B, dated the 23rd 1897.

1. Any goods originally consigned from Bombay, Karachi or other place notified as infected with plague, and believed to have been packed in such place, may, before admission into a municipality or cantonment in these provinces, be detained for examination by the municipal or cantonment authority at an octroi post, at the nearest railway station or at such place on the outskirts of municipal or cantonment limits as may be appointed by it for the purpose. Examination before entry into Municipal or Cantonment limits.

2. Any case in which such goods are packed may be opened by the municipal or cantonment authority for the purpose of examination, and if, in the opinion of the Health Officer or of an officer deputed by him for the purpose, the materials used for packing, such as rags, straw, grass, paper, etc., are likely to convey infection, they may be destroyed. Opening of packed goods for examination. Destruction of dangerous packing stuff.

3. Immediately on the detection of such goods, written notice shall be given to the consignee in order that he may attend to witness Notice to consignee.

the examination, and to take delivery of the goods subsequently. No examination of goods shall be made except in the presence of the consignee or his authorised agent.

RAGS.

No. 49.

Notification No. ³³⁹~~XVI-404-B-458~~, dated the 1st May 1897.

In exercise of the power conferred on this Government by Notification No. 302, dated 4th February 1897, of the Governor General of India in Council, the Lieutenant-Governor of the North-Western Provinces and Chief Commissioner of Oudh is pleased to make the following rules under Act No. III of 1897 (an Act to provide for the better prevention of the spread of Dangerous Epidemic Disease) :—

Disinfection
and destruction of
rags.

Inspection of
place where rags
are collected.

Method of disin-
fection.

Owner of a
collection of rags
to obey order
under rule 1.

1. The Magistrate of the district may cause to be disinfected or, with the concurrence of the Health Officer, destroyed any collection of rags in rag-pickers' houses, rag stores, paper mills, or elsewhere.
2. Any place in which rags are collected shall be open to the inspection of the Magistrate of the district, the Health Officer, and any official appointed by the Magistrate of the district, for the purpose.
3. To effect disinfection, rags should be soaked in a solution of corrosive sublimate (1 in 1,000) or carbolic acid (1 in 40), and then be well exposed to the sun for some hours.
4. The owner of a collection of rags shall comply with any order issued by the Magistrate of the district under rule 1.

Regulations issued by the Government of the Punjab.

CONTROL OF TRAFFIC.

No 50.

Regulations for the control of Railway Traffic.

Notification No. 146, dated the 12th February 1897.

~~Preamble.~~

In exercise of the powers conferred by the Notification of the Government of India, No. 302, dated 4th February 1897, the Hon'ble the Lieutenant-Governor being satisfied that the Punjab is threatened with an outbreak of a dangerous epidemic, namely, bubonic plague, and that the ordinary provisions of the law are insufficient for the purpose of preventing such outbreak, is pleased to prescribe the following Regulations for the inspection of persons travelling

by railway and the segregation of persons suspected of being infected with bubonic plague, and for other matters under sub-section (1) and sub-clause (b) of sub-section (2) of section 2 of the Epidemic Diseases Act, 1897:—

I.—In the following Regulations:—

“Place of inspection” means any place which may be notified by the Local Government to be a place of inspection. Definitions.

“Inspecting Medical Officer” means a person appointed by an order in writing by the Local Government to be an Inspecting Medical Officer.

II.—The Local Government may notify any railway station or any place in the vicinity thereof to be a place of inspection, and may by order in writing appoint one or more Inspecting Medical Officers for the same. Notification of inspection stations.

III.—Every Inspecting Medical Officer who is unavoidably prevented from discharging all or any of his functions as such may by order in writing appoint any Assistant Surgeon or Hospital Assistant temporarily to discharge such functions, and every Assistant Surgeon and Hospital Assistant so appointed shall so far as such functions are concerned be deemed for the purposes of these regulations to be an inspecting Medical Officer. Deputation of functions by Inspecting Officer.

IV.—An Inspecting Medical Officer may at his place of inspection direct any person travelling by railway to leave the carriage in which he is travelling and come on to the platform or on to the line, and may prohibit any such person from leaving the platform or any other portion of the place of inspection. Platform inspection.

V.—(1) An Inspecting Medical Officer may at his place of inspection make a medical inspection and examination of any person travelling by railway in such manner and to such extent as he thinks necessary in order to ascertain whether there is reason to believe or suspect that such person is or may be infected with bubonic plague: provided that such inspection, or examination shall not be made in any manner or to any extent to which such person objects. Examination of passengers.

(2) An Inspecting Medical Officer may put to any such person any questions he thinks fit in order to ascertain whether there is reason to believe or suspect as aforesaid, and such person shall be bound to answer truly any question so put to him. Questioning passengers.

VI.—Where, as the result of such inspection or examination or otherwise, the Inspecting Medical Officer considers that there is reason to believe or suspect that any person is or may be infected with bubonic plague, or where any person makes any objection under the proviso to clause V, sub-clause (1) of these Regulations, the Segregation of suspect cases.

Inspecting Medical Officer may direct that such person be removed to and detained in any building, tent or other place, whether near the place of inspection or elsewhere, until the Inspecting Medical Officer or some other Medical Officer empowered in this behalf by a written order of the Local Government certified in writing that in his opinion there is no longer any reason for believing or suspecting such person to be infected as aforesaid.

Attendants permitted to accompany segregated persons.

VII.—Any person in respect to whom a direction has not been given under clause VI may apply to the Inspecting Medical Officer to be allowed to attend upon any person in respect to whom such a direction has been given, and the Inspecting Medical Officer shall, except for reasons to be recorded by him in writing, grant such application.

Detention of attendants.

VIII.—Any person who has made an application under the last foregoing clause and whose application has been granted shall be detained in such building, tent or other place, whether near the place of inspection or elsewhere, as the Inspecting Medical Officer may direct until the Inspecting Medical Officer or some other Medical Officer empowered in this behalf by a written order of the Local Government certifies in writing that in his opinion there is no longer any reason for detaining such person.

Persons detained until certified to be safe.

IX.—No person in respect to whom a direction under clause VI or VIII of these Regulations has been given shall leave any building, tent or other place in which an Inspecting Medical Officer has directed him to be detained until such Inspecting Medical Officer certifies in writing that in his opinion there is no longer any reason for believing or suspecting such person to be infected as aforesaid, or that there is no longer any reason for detaining such person as the case may be.

Destruction or disinfection of articles.

X.—The Inspecting Medical Officer may order the destruction or disinfection of any article which is or has been in the possession of any person in respect to whom a direction under clause VI or VIII has been given, or which is or has been in the possession of any person whom the Inspecting Medical Officer considers to have been in dangerous proximity to such person:—

Payment of compensation.

Provided that compensation may, in the discretion of the officer hereinafter empowered to award the same, be paid for the destruction or injury of any article under this clause.

Notification No. 634 of the 8th April 1897.

Application for compensation to the District Magistrate.

XI.—Applications for the payment of compensation under the last foregoing clause may be made to the District Magistrate who shall upon receipt of any such application determine by order in

writing the amount of such compensation, if any, and such order shall be final.

XII.—The Local Government may determine in what cases or ^{Incidence of} classes of cases any charges for the provision of accommodation, ^{expenditure.} diet and treatment for persons detained under these Regulations and any sums payable as compensation under them shall be defrayed or paid by any Local Body : and such Local Body shall thereupon become liable to defray such charges or pay such compensation accordingly.

XIII.—In every case in which any charges are to be defrayed or ^{Payment by} any compensation is payable under these Regulations for which no ^{Local Govern-} Local Body is liable under an order issued under the last preceding clause or under any other law or rule having the force of law, such charges shall be defrayed or compensation shall be paid by the Local Government.

Provided that nothing in this clause shall be deemed to prevent ^{Recovery.} the Local Government from recovering any moneys thus paid from any Native State or Railway Administration or Railway Company when such moneys are by agreement or otherwise so recoverable.

XIX.—The powers conferred on the Inspecting Medical Officer ^{Control.} by these Regulations shall be exercised subject to the control of the Magistrate of the district, the Commissioner of the Division and of the Local Government.

No. 51.

Notification No. 296, dated the 2nd March 1897.

In exercise of the powers conferred by the Notification of the ^{Preamble.} Government of India, No. 302, dated 4th February 1897, the Honourable the Lieutenant-Governor, being satisfied that the Punjab is threatened with an outbreak of a dangerous epidemic disease, namely, bubonic plague, and that the ordinary provisions of the law are insufficient for the purpose of preventing such outbreak, is pleased to prescribe the following Regulations under sub-section (1) and sub-clause (b) and sub-section (2) of the Epidemic Diseases Act, 1897 :—

I.—A station master, at a railway station which is not a place ^{Conveyance of} of inspection, or at a railway station which is a place of inspection, ^{suspect case to} in the absence of an Inspecting Medical Officer duly appointed by ^{next inspection} station, order in writing to such place of inspection, may direct any person travelling by railway or being on any portion of the railway premises, who, he sees reason to believe or suspect, is or may be infected with bubonic plague, to proceed to the next station which is a place of inspection to which an Inspecting Medical Officer has been duly

appointed : and such person shall thereupon be bound to proceed to such station.

No extra charge
to traveller.

II.—No additional charge shall be made by any Railway Administration to any person in respect to whom a direction under the last preceding clause has been given, on account of the journey from the station at which such direction was given to the station to which he was directed to proceed ; and if at the station to which he was directed to proceed an Inspecting Medical Officer declares that he sees no reason to believe or suspect that such person is or may be infected with bubonic plague, the Railway Administration shall give to such person a free pass to return by railway to any station for which he holds a ticket.

Notification No. 822, dated the 29th April 1897.

No. 52.

Preamble.

In exercise of the powers conferred by the Notification of the Government of India, No. 302, dated the 4th February 1897, the Honourable the Lieutenant-Governor, being satisfied that the Punjab is threatened with an outbreak of a dangerous epidemic, namely, bubonic plague, and that the ordinary provisions of the law are insufficient for the purpose of preventing such outbreak, is pleased to prescribe the following Regulations under sub-section (1) and sub-clause (b) of sub-section (2) of section 2 of the Epidemic Diseases Act, 1897 :—

Prohibition
against leaving
railway limits at
specified places.

I.—The Local Government may by notification prohibit all persons or any class of persons travelling by railway or all persons or any class of persons travelling by railway from or towards any specified local area, or from or in any specified direction, from leaving the railway limits at any place or places specified in such notification : and no person shall leave the railway limits in contravention of such notification.

Preventing
evasion of rule.

II.—When any person who holds a ticket for any place at which he is prohibited by a notification under the last preceding clause from leaving the railway limits does not leave the railway limits before arrival at such place, the Railway Administration concerned shall convey him by railway, without additional charge, to the next nearest station at which he is not prohibited from leaving the railway limits.

No extra charge
to traveller.

III.—When a Railway Administration has conveyed any person to any station under the last preceding clause, and the station for which such person holds a ticket is not a place at which he is prohibited, when travelling from the station to which he was conveyed under that clause, from leaving the railway limits, such Railway Administration shall, if desired by such person so to do, convey him by railway, without additional charge, to the station for which he

holds a ticket, without any further delay than is required or authorized by any law, or any bye-law, rule or regulation having the force of law, for the time being in force, or is necessitated by the timing of the trains.

IV.—Nothing in the two foregoing clauses shall be deemed to require any Railway Administration to convey any person to any station otherwise than by a train advertised in the published time tables of such Railway Administration and intended by such Railway Administration for passenger traffic.

Person can only claim to be carried by advertised trains.

No. 53.

Notification No. 823, dated the 29th April 1897.

In exercise of the powers conferred by clause I of the Regulations published with Notification No. 822, dated the 29th April 1897, the Honourable the Lieutenant-Governor is pleased to prohibit all intermediate and 3rd class passenger by up trains from the province of Sind from leaving the North-Western Railway limits at any place between the northern boundary of the province of Sind and the railway station of Khanpur.

Prohibition against allig between Sind frontier and Khanpur.

No. 54.

Railway stations notified to be places of inspection.

Notification No. 147, dated the 12th February 1897.

Whereas His Highness the Maharaja of Patiala has granted to the British Government full jurisdiction within the lands which lie within his State and are occupied or may be hereafter occupied by the Rewari-Ferozepore State Railway (including the lands occupied as stations, out-buildings and for other railway purposes): and whereas in exercise of this jurisdiction and of the powers conferred by sections 4 and 5 of the Foreign Jurisdiction and Extradition Act, 1879, and of all other powers enabling him in this behalf, the Governor General in Council declared by the Notification in the *Gazette of India*, No 3927-I, dated the 5th November 1886, that all laws for the time being in force in the Hissar District of the Punjab were thereby extended to the said lands: and whereas in virtue of the said Notification the Epidemic Diseases Act, 1897, and the Regulation made under sub-section (1) and under sub-clause (b) of sub-section (2) of section 2 of the said Act, and published with the Notification in the *Punjab Gazette*, No. 146, dated 12th February 1897, are extended to the railway station of Bhatinda on the Rewari-Ferozepore State Railway and the lands occupied as out-buildings and for other railway purposes at and in the neighbourhood of the said station; the

Bhatinda.

Lieutenant-Governor, in exercise of the power conferred upon him by clause II of the said Regulations, hereby notifies the said railway station and the said lands to be a place of inspection for the purposes of the said Regulations.

Notification No. 148, dated the 12th February 1897.

No. 55.

In exercise of the power conferred upon him by clause II of the Regulations made under sub-section (1) and under sub-clause (b) of sub-section (2) of section 2 of the Epidemic Diseases Act, 1897, and published with Notification No. 146, dated 12th February 1897, the Honourable the Lieutenant-Governor hereby declares the following railway stations and places in the vicinity thereof to be places of inspection for the purposes of the said Regulations, namely:—

- (1) The railway station of Khanpur and so much of the lands lying within 100 yards of the outer limits of such station as have been ceded by His Highness the Nawab of Bahawalpur in full sovereignty to the British Government.
- (2) The following railway stations together with an area bounded by a line drawn round each at a distant of 100 yards from its outer limits:—

Sher Shah.	Gurdaspur.
Ghazi Ghat.	Meean Meer East.
Mooltan Cantonment.	Rewari.
Mooltan City.	Hissar.
Chichawatni.	Ferozepore Cantonment.
Montgomery.	Ferozepore City.
Raewind.	Lahore.
Meean Meer West.	Guzranwala.
Delhi.	Sialkot.
Karnal.	Gujrat.
Umballa Cantonment.	Khushab.
Umballa City.	Darya Khan.
Kalka.	Jhelum.
Ludhiana.	Rawalpindi.
Jullundur Cantonment.	Khushalgarh.
Jullundur City.	Hasan Abdal.
Amritsar.	Peshawar City.
	Peshawar Cantonment.

Notification No. 332, dated the 6th March 1897.

No. 56.

In exercise of the power conferred upon him by clause II of the Regulations made under sub-section (1) and under sub-clause (b)

of sub-section (2) of section 2 of the Epidemic Diseases Act, 1897, and published with Notification No. 146, dated the 12th of February 1897, the Honourable the Lieutenant-Governor hereby declares the following railway stations and places in the vicinity thereof to be places of inspection for purposes of the said Regulations, namely:—

Sadikabad.	Chanigot.
Rahim Yarkhan.	Ahmadpur.
Kotsamaba.	Mubarakpur.
Firoza.	Kulanchwala.
Chandri.	Samasata.

Regulations for the control of river and road traffic.

No. 57.

Notification No. 312, dated the 5th March 1897.

In exercise of the powers conferred by the Notification of the Government of India, No. 302, dated the 4th of February 1897, the Honourable the Lieutenant-Governor, being satisfied that the Punjab is threatened with an outbreak of a dangerous epidemic, namely, bubonic plague, and that the ordinary provisions of the law are insufficient for the purpose of preventing such outbreak, is pleased to prescribe the following Regulations under sub-section (1) and sub-clause (b) of sub-section (2) of section 2 of the Epidemic Diseases Act, 1897:—

Preamble.

I.—The Local Government may notify any ferry or any portion of any navigable stream, together with the approaches to or landing places of any such public ferry and any area on either or both banks of any such navigable stream, and any portion of any public road or place in the vicinity thereof, to be a place of inspection, and may, by order in writing, appoint one or more Inspecting Medical Officers for the same.

II.—When any Notification under the foregoing clause has issued, the Regulations published with Punjab Government Notification No. 146, dated 12th February 1897, shall, so far as may be, be deemed to apply to the place of inspection so notified, and to all directions and orders given thereat; and when any order in writing has been made appointing one or more Inspecting Medical Officers for any such place of any inspection, the aforesaid Regulations shall, so far as may be, be deemed to apply to such Inspecting Medical Officer or Officers, to all directions and orders given by such Inspecting Medical Officers: and every person shall obey any such direction or order as if it had been given under the provisions of the aforesaid Regulations.

**Detention of
travellers and
vessels.**

III.—For the purposes of these Regulations, clause IV of the Regulations published with Punjab Government Notification No. 146, dated 12th February 1897, shall be deemed to provide as follows:—

An Inspecting Medical Officer may at his place of inspection direct any person travelling by water or road to proceed to and remain in any place or places from time to time specified by him, and may direct that any vessel be brought to and kept at any place or places from time to time specified by him.

**Adoption of
clause V of the
railway rules.**

IV.—For the purposes of these Regulations, clause V of the Regulations published with Punjab Government Notification No. 146, dated 12th February 1897, shall be read as though for the words "travelling by railway" in sub-clause (1) were substituted the words "travelling by water or road."

**Restrictions
with regard to
routes.**

V.—The Local Government may by notification prohibit the public or any class of persons from travelling to or from any local area specified in such notice either absolutely, or otherwise than by way of a place or places specified in such notification: and when any such notification has issued, no person shall travel to or from any local area in contravention of such notification.

**Rojhan in the
Dera Ghazi
Khan District
and the Indus
ferry of Mithan-
kot declared
places of
inspection.**

Notification No. 313, dated the 5th March 1897.

No. 58.

Under clause I of the Regulations published with Punjab Government Notification No. 312, dated 5th March 1897, the Honourable the Lieutenant-Governor is pleased to declare that the following are places of inspection:—

- (1) The village of Rojhan in the Dera Ghazi Khan District, together with an area bounded by a line 200 yards outside the outer limits of the said village.
- (2) The ferry of Mithankot, together with the approaches to and landing places of the said ferry.

**Travellers from
Sind prohibited
from going to
Sakhi-Sarwar.**

Notification No. 314, dated the 5th March 1897.

No. 59.

Under clause V of the Regulations published with Punjab Government Notification No. 312, dated 5th March 1897, the Honourable the Lieutenant-Governor is pleased to prohibit all persons coming either directly or indirectly from the province of Sind from travelling to or to the neighbourhood of Sakhi-Sarwar.

**Travellers from
Sind and Bha-
walpur to pass
via an inspection
station.**

Notification No. 315, dated the 5th March 1897.

No. 60.

Under clause V of the Regulations published with Punjab Government Notification No. 312, dated 5th March 1897, the Honourable the Lieutenant-Governor is pleased to prohibit all persons from travelling from the province of Sind or from the State of Bahawalpur to

any portion of the Dera Ghazi Khan District otherwise than by way of the place of inspection at Rojhan, unless they travel by way of the place of inspection at Mithankot or by some public ferry higher up the stream than Mithankot.

GENERAL REGULATIONS.

No. 61.

Notification No. 350, dated the 8th March 1897.

In exercise of the powers conferred by the Notification of the Preamble. Government of India, No. 302, dated 4th February 1897, the Honourable the Lieutenant-Governor, being satisfied that the Punjab is threatened with an outbreak of a dangerous epidemic, namely, bubonic plague, and that the ordinary provisions of the law are insufficient for the purpose of preventing such outbreak, is pleased to prescribe the following Regulations under sub-section (1) and sub-clause (b) of sub-section (2) of section 2 of the Epidemic Diseases Act :—

I.—The District Magistrate may direct any person, who he sees reason to believe or suspect is or may be infected with bubonic plague, to proceed to and remain in any place or places from time to time specified by him, and every person to whom any such direction is given shall obey the same. *Segregation.*

II.—The District Magistrate may order the disinfection or destruction of any article which is or has been in the possession of any person, who he sees reason to believe or suspect is or may be infected with bubonic plague, or is or has been suffering from that disease, or which is or has been in the possession of any person whom he considers to have been in dangerous proximity to any such person. *Disinfection or destruction of infected articles.*

III.—The District Magistrate may order the disinfection or destruction of any building or part of any building in which any person is or has been, who he sees reason to believe or suspect is or may be infected with bubonic plague or is or has been suffering from that disease. *Disinfection or destruction of buildings.*

IV.—Compensation may, in the discretion of the officer herein-after empowered to award the same, be paid for the destruction of or injury to any article or building under either of the two last preceding clauses. *Compensation; Notification No. 634, dated the 8th April 1897.*

V.—The District Magistrate may by order in writing delegate to any person exercising 1st Class Magisterial powers or to any commissioned medical officer all or any of the powers conferred upon him by the foregoing clauses of these Regulations; and any direction or order given by any such officer under any powers thus delegated to him shall be deemed to have been given by the District Magistrate for the purposes of these Regulations. *Delegation of powers.*

Disposal of applications for compensation by the District Magistrate.

VI.—Applications for the payment of compensation under clause IV may be made to the District Magistrate. The District Magistrate shall, upon receipt of any such application, determine by order in writing the amount of such compensation (if any) and such order shall be final.

Control.

VII.—The powers delegated to any person by the District Magistrate under clause V of these Regulations shall be exercised subject to the control of the District Magistrate, and the powers conferred upon the District Magistrate by these Regulations shall be exercised subject to the control of the Commissioner of the Division and of the Local Government.

Notification No. 352, dated the 8th March 1897.

No. 62

Preamble.

In exercise of the powers conferred by the Notification of the Government of India, No. 302, dated 4th February 1897, the Honourable the Lieutenant-Governor, being satisfied that the Punjab is threatened with an outbreak of a dangerous epidemic, namely, bubonic plague, and that the ordinary provisions of the law are insufficient for the purpose of preventing such outbreak, is pleased to prescribe the following Regulations under sub-section (1) and sub-clause (b) of sub-section (2) of section 2 of the Epidemic Diseases Act:—

Report of cases in municipalities.

I.—Every person who is bound under any Municipal bye-law for the time being in force to report the occurrence of any death to any person shall report the occurrence of any case of bubonic plague within three hours of the same coming to his notice to an officer in charge of a police station in any circumstances in which he would have been bound, if the person attacked by the disease had died, to report the death within any period to any person.

Persons bound to make reports.

II.—The following persons shall report the occurrence of any case of bubonic plague under the circumstances set forth in each sub-clause respectively within three hours of the same coming to their notice to an officer in charge of a police station, or in cases where the disease appears at a place more than three miles from the nearest police station, to a village lambardar, namely:—

- (1) When the case of plague occurs in any house, the eldest adult residing in such house, who is not himself or herself attacked by the plague.
- (2) When the case of plague occurs in any hotel, dāk bungalow or public serai, the proprietor of such hotel, dāk bungalow or public serai, or in the default or in the absence of such proprietor the person who for the time being is managing such hotel, dāk bungalow or public serai; or in the default or absence of such person, every servant employed in

such hotel, dāk bungalow or public serai by proprietor or manager thereof.

- (3) When the case of plague is attended by any medical practitioner, such medical practitioner.

III.—Every Municipal Commissioner and every servant of a Municipal Committee, every village lambardar and chaukidar, every kanungo and patwari, every police officer, and every jagirdar, mofidar and pensioner, shall without unavoidable delay report the occurrence of any case of bubonic plague which comes to his knowledge to the officer in charge of the nearest police station. Local officials and servants bound to report cases.

IV.—If a case of bubonic plague occurs in any railway train or on any railway premises, the person discharging the duties of station master at the nearest station to the place at which the case of plague is discovered shall report the case by telegram to the Deputy Commissioner of the district in which the station is situated or, if the station is not situated in British territory, but in territory over which the British Government has jurisdiction, to the Deputy Commissioner of the district, the head-quarters of which is nearest to the station. Report by the station master to the Deputy Commissioner.

V.—Every person who, under clause I, II, or sub-clause (1) or (2) of clause III of these Regulations, is bound to report the occurrence of any case of bubonic plague shall report the arrival at any place in the Punjab of any person from any part of the Bombay Presidency or Sind in any circumstances in which he would have been bound, if the person who has arrived from the Bombay Presidency or Sind had been attacked by bubonic plague, to report the fact that a case of that disease had occurred. Such report shall be made without unavoidable delay to the officer in charge of the nearest police station : Report of the arrival of persons from the Bombay Presidency or Sind.

Provided that any person, not being a village lambardar, and residing more than three miles from the nearest police station, shall be deemed to have done what is required under this clause if he makes the report without unavoidable delay to a village lambardar.

Proviso.

No. 63.

EXECUTIVE INSTRUCTIONS.

Defection of cases of plague in rural areas.

1. The officer in charge of every police station shall forthwith bring upon a list (A) the names of all villages in his circle, and of all mohallas or streets in towns situated in his circle, the inhabitants or any portion of the inhabitants of which are ascertained to have trade relation with the Bombay Presidency or Sind. Police station to maintain a list (A) of places having trade relation with the Bombay Presidency or Sind.
2. Every chaukidar shall enquire and report without delay the name of every person in his village who has arrived from the Bombay Presidency or Sind since the 1st of February 1897; he shall also report all fresh arrivals as they occur. The names of such persons Chaukidars to report names of arrivals from the Bombay Presidency or Sind. A list (B) to be

kept at the police station.

reported by the chaukidar or ascertained from other sources, will be entered by the officer in charge of the police station on a list (B).

Enquiry to be made as to cause of all deaths in A villages.

3. In the case of every village entered in list A, the chaukidar shall make daily reports of all deaths. The officer in charge of the police station on receiving a report from a chaukidar or otherwise of a death in any village, mohalla or street, entered in list A, shall carefully enquire whether the deceased person had symptoms of bubonic plague as described in the general instructions issued on the subject.

Similar enquiry to be made with regard to deaths of persons in list B.

4. The officer in charge of the police station shall make similar enquiry on receiving a report of the death of any person whose name is entered in list B, or of any person in the household of any such person.

Enquiry to be made on occurrence of numerous or unusual deaths in any village.

5. Whenever the deaths reported from any village, street or mohalla (whether entered in list A or not) are more frequent than usual, and when sudden deaths occur which are attributed to fever, the officer in charge of the police station shall make enquiries with a view to ascertaining whether the symptoms of bubonic plague existed.

Report and procedure on occurrence of suspicious cases.

6. On ascertaining from any source that a death was preceded by symptoms such as those of bubonic plague, the officer in charge of the police station shall send immediate intimation to the nearest medical officer or medical subordinate not lower in rank than Hospital Assistant and also to the District Superintendent of Police and the Magistrate of the district; and shall either go himself or depute a competent subordinate to make an enquiry, any action taken being recorded in the station diary.

Camping out of persons who had lived with deceased and adoption of precautions.

7. If the police officer making the enquiry directed by rule 6 is of opinion that the death was due to bubonic plague, he shall do what he can do without the use of compulsion to induce the persons living in the house in which the death occurred to leave it and camp out in the open, and to see that the general instructions appended to these rules are in other respects observed.

Report by police officer.

8. Every police officer on receiving intimation from any source of the occurrence of a case of plague or suspected case of plague shall report it immediately to the District Magistrate or to some Magistrate to whom powers have been delegated by the District Magistrate under clause V of the Regulations published with Notification No. 350, dated 8th March 1897, and also to the nearest Magistrate.

Report by medical officers, medical enquiry and treatment.

9. Every medical subordinate and medical officer subordinate to the Civil Surgeon, on receiving intimation from any source of the occurrence of a case of plague or suspected case of plague, shall send

immediate intimation to the District Magistrate or to some Magistrate to whom powers have been delegated by the District Magistrate under clause V of the Regulations published with Notification No. 350, dated 8th March 1897, and to the Civil Surgeon; and shall proceed himself, or depute a competent subordinate to proceed, to the spot to make an enquiry, and to treat the patient, and do what he can do without the use of compulsion to see that the general instructions appended to these rules are observed.

10. Every Magistrate on receiving intimation from any source of the occurrence of a case of plague or suspected case of plague shall send immediate intimation to the District Magistrate or to some Magistrate to whom powers have been delegated by the District Magistrate under clause V of the Regulations published with Notification No. 350, dated 8th March 1897, and shall, if practicable, himself proceed to the spot and satisfy himself that these rules and the general instructions appended to them are being observed, without the use of any compulsion, except such as may be justified by legally authorised action under the above-mentioned Regulations.

Report by
Magistrates and
action to be taken
by them.

Symptoms and treatment.

The symptoms of plague are fever of recent commencement, severe headache, great depression, marked weakness, severe backache, also frequently pain in the chest and cough. When the fever has lasted two or three days, there are sometimes painful swellings in the groin or armpits. There is often delirium and rapid sinking, the patient dying in many cases on the second or third day.

Symptoms.

The treatment consists in having a free supply of fresh air. All doors and windows should be kept open. A purgative should be given unless the patient has diarrhoea. Cool drinks and sherbets of lime-juice may be given, and food in small quantities but frequently. Suitable foods are arrowroot or sago thinly made, thin whey, or, if the patient's caste allows it, soup. Any of these may be given in quantities of a chittack every second hour. Any attempt to give patients ordinary large meals or solid food would be injurious. When there are swellings, hot fomentations or hot poultices should be applied to them.

Treatment.

The faecal or vomited matter and urine of the patient should be buried at least two feet deep at some distance from the hut.

Excretions.

Segregation and Disinfection.

If a patient is living in a town or village he or she should be removed as quickly as possible to a grass shed. All that is necessary is a roof to keep the heat off and light screen walls. The more open

Segregation of
patients. Rela-
tives to be al-
lowed to accom-
pany patient.

the structure the better. One or two relatives should be allowed to accompany the sick person and to remain in attendance on him or her. These attendants should not be allowed to enter the village or town so long as they are in such attendance and for ten days after the recovery or death of the patient. Arrangements should be made for food being carried to the sick person and attendants, but whoever takes the food should not enter the hut where the sick person is.

Segregation of the healthy living in the house.

All people who had been living in the house or hut where the sickness took place should be removed to a grass hut at some little distance from the town or village. Separate huts for males and females may be necessary. Similar arrangements to those just mentioned should be made for their food and water. They ought not to be allowed to draw water from wells themselves.

After ten days if no disease appears amongst them they may return to the village.

Disinfection or destruction of the house.

The house in which a case of plague has occurred should be burnt if of grass. If masonry or mud, the ceiling and walls should be whitewashed and the earthen floor dug up for three inches deep. This earth should then be removed and burned outside the town. The doors and windows should be left wide open for twelve days; the house should not be re-occupied before this time.

Disinfection or destruction of infected clothing, bedding, etc.

Light and air are most useful purifiers. The clothing and bedding of a sick person and his attendants, if of no value, should be burnt. If of better quality, they ought to be thoroughly boiled and then dried in the sun. Charpoys used by the plague patients should invariably be burnt.

Disposal of corpses.

Dead bodies should be buried six feet deep, if Muhammadan, in a place distant from town and from water-supply. If Hindu, they should be completely burnt in an isolated place.

The clothing of people who carry dead bodies ought to be thoroughly boiled.

RULES REGARDING VEHICLES.

Notification No. 467, dated the 22nd March 1897.

No. 64.

Preamble

In exercise of the powers conferred by the Notification of the Government of India. No. 302, dated 4th February 1897, the Honourable the Lieutenant-Governor, being satisfied that the Punjab is threatened with an outbreak of a dangerous epidemic, namely bubonic plague, and that the ordinary provisions of the law are insufficient for the purpose of preventing such outbreak, is pleased to prescribe the following regulation under sub-section (1) and sub-clause (b) of sub-section (2) of section 2 of the Epidemic Diseases Act, 1897:—

I.—Except as provided in the next following clause, no proprietor or driver of any licensed hackney carriage or of any ekka, rath, baili or other vehicle ordinarily employed to carry persons for hire shall convey or permit to be conveyed in any such licensed hackney carriage or vehicle any person who, there is reasonable ground to believe or suspect, is or may be infected with bubonic plague, or the corpse of any person who, there is reasonable ground to believe or suspect, has died from that disease.

II.—A District Magistrate and any person to whom power under this clause may be delegated by any District Magistrate, and any person who has been appointed to be an Inspecting Medical Officer under any Regulation made under the Epidemic Diseases Act, 1897, may direct the proprietor or driver of any licensed hackney carriage or of any ekka, rath, baili or other vehicle ordinarily employed to carry persons for hire, to convey or permit to be conveyed in such licensed hackney carriage or vehicle to any place any person who, there is reasonable ground to believe or suspect, is or may be infected with bubonic plague, or the corpse of any person who, there is reasonable ground to believe or suspect, has died from that disease, and such proprietor or driver shall be bound to obey every such direction.

III.—When any person who, there is reasonable ground to believe or suspect, is or may be infected with bubonic plague, or the corpse of any person who, there is reasonable ground to believe or suspect, has died from that disease, has been conveyed in any licensed hackney carriage or in any ekka, rath, baili or other vehicle ordinarily employed to carry persons for hire, the following consequences shall ensue, namely,—

- (1) The proprietor and driver of such licensed hackney carriage or vehicle shall not convey or permit to be conveyed in it any person otherwise than in accordance with a direction given under clause II of these Regulations for a period of seven days from the time when such licensed hackney carriage or vehicle was so used or until it has been disinfected as provided in the following sub-clause.
- (2) The District Magistrate or any Commissioned Medical Officer acting subject to the general control of the District Magistrate or any person to whom power under this sub-clause may be delegated by the District Magistrate or any Commissioned Medical Officer acting subject to the general control of the District Magistrate may carry out or cause to be carried out any measures that he may think fit for the disinfection of such licensed

Public conveyances not to carry plague patients.

Except under the order of competent authority.

Public conveyance in which plague patient has been carried not to be used again for seven days or until it has been disinfected.

Disinfection.

hackney carriage or vehicle, and may destroy or cause to be destroyed any portion of the furniture, cushions, lining or hood or other covering thereof.

Payment of compensation.

IV.—Compensation shall be paid to the proprietor of any vehicle in which any person or corpse has been conveyed in pursuance of a direction given under clause II of these Regulations in respect of the following matters, namely,—

- (1) Disuse of the vehicle under sub-clause (1) of clause III of these Regulations.
- (2) Injury to or destruction of any article under sub-clause (2) of the aforesaid clause.

Disposal of applications.

V.—Applications for the payment of compensation under the last foregoing clause may be made to the District Magistrate, who shall upon receipt of any such application determine by order in writing the amount of such compensation, if any, and such order shall be final.

Incidence of expenditure.

VI.—Compensation awarded under the last foregoing clause in respect to any vehicle ordinarily employed to carry persons for hire wholly or partly within the limits of any Municipality shall be paid by the Municipal Committee of such Municipality.

EXECUTIVE INSTRUCTIONS.

Circular letter No. 1025, dated the 19th June 1897.

No. 65.

Practical instructions appended to the circular to supersede previous instructions.

The following instructions which have been prepared in consultation with Surgeon-Colonel Raye, Inspector-General of Civil Hospitals, and Brigade Surgeon-Lieutenant-Colonel Roe, Sanitary Commissioner, for guidance in the event of the recrudescence of bubonic plague and an invasion of the Punjab by the disease are intended to incorporate and supersede previous instructions on the same points which have been issued by the Inspector-General of Civil Hospitals and the Sanitary Commissioner. It is considered convenient that they should be circulated to the Heads of all Departments as well as to the officers on whom will devolve the duty of generally enforcing precautionary measures, because Government buildings in the charge of particular departments may become infected with the disease, and Government servants occupying such buildings may be attacked.

Reference to clauses of the Epidemic Diseases Act, authorising the adoption of the precautionary measures.

2. In connection with the instructions under heads A and C, I am directed to draw attention to clauses II, III and V of the Regulations published with Notification No. 350, dated 8th March 1897. Clause II empowers the District Magistrate to order the disinfection or destruction of any article which is or has been in the possession of any person, who, he sees reason to believe or suspect, is or may be

infected with bubonic plague, or is or has been suffering from that disease, or which is or has been in the possession of any person whom he considers to have been in dangerous proximity to any such person. Clause III empowers the District Magistrate to order the disinfection or destruction of any building or part of any building in which any person is or has been who, he sees reason to believe or suspect, is or may be infected with bubonic plague, or is or has been suffering from that disease. Clause V allows the District Magistrate by order in writing to delegate these powers to any person exercising 1st Class Magisterial powers or to any Commissioned Medical Officer. Clause IV, regarding payment of compensation, has been modified by Notification No. 634, dated 8th April 1897, and the District Magistrate now has a discretionary authority to award or withhold compensation for injury done by action under clauses II and III.

A.—Instructions regarding the treatment of buildings and sheds which have been occupied by persons infected with Plague.

1. Fire is the most effective means of destroying the bacillus of plague. All grass huts and buildings of small value which have been occupied by a plague patient should therefore be burned down wherever this can be done without excessive danger to surrounding property.

2. Buildings which it is for any reason not considered desirable to burn down should be dealt with as follows :—

I.—Having removed all furniture, the walls, floors and the inner side of the roof or ceiling should be sprayed or hosed with water containing a powerful disinfectant. The furniture should be similarly treated (though articles of little value may with advantage be burned).

II.—The best disinfectant for this purpose is a solution of perchloride of mercury otherwise known as corrosive sublimate (1 part to 1,000 parts of water or 1 ounce to 6 gallons, a quantity which when sprayed carefully will disinfect from 2,000 to 3,000 square feet of surface). It is understood that large quantities of this can be obtained from Messrs. Waldie & Co., Calcutta, Messrs. Smith, and Stanistreet, or Messrs. Peake, Allen & Co., Lucknow, as well as from other nearer sources.

III.—Failing perchloride of mercury, biniodide of mercury (1 per 5,000 solution) or carbolic acid (20 per 100 solution) may be used in lieu.

IV.—It is a wise precaution to colour the solution of perchloride of mercury with aniline blue to prevent the possibility of poisoning. Persons engaged in the work should be

occasionally examined to see that no signs of mercurial poisoning are present.

V.—The spraying or hosing may be done by means of a wooden gardener's syringe with a rose over the end. Wooden buckets should be employed for holding the solution, as mercury acts upon metals. Failing wooden buckets, earthen gumlahs or glazed earthenware may be used and should be destroyed after use. A mop may be used to spread the disinfectant if a syringe is not procurable.

VI.—One of the objects of the spraying or hosing is to lay dust, which is a dangerous vehicle of disease. All crevices or places where dust lodges should therefore be thoroughly soaked with the disinfecting solution. For the same reason every effort should be made not to raise dust in a plague-infected dwelling.

VII.—If in any case disinfectants are not immediately available, another method of treating interiors is to light small fires all over the ground, spreading out the red cinders so as to thoroughly scorch the entire floor and raise the temperature of the room or hut to the highest point possible above 140° Fahrenheit, as at this temperature the germ is said to die.

VIII.—When the rooms have had their preliminary treatment by fire or by spraying with disinfectants, the floor, if kacha, should be dug up to the depth of 3 or 4 inches and the loose earth mixed with fresh lime which will act upon it as a disinfectant. This earth should then be carried away, if possible, in a covered vessel, and buried at a distance from all human habitations. The walls of the room or rooms should then be whitewashed and the building left uninhabited for a period of twelve days.

IX.—It will always assist the process of disinfection to leave a building or room open to sun and air by removing the doors, windows and even the roof, and this is recommended as a supplementary method when feasible.

X.—Persons with scratches, cuts or sores on their persons, especially on the hands, feet or face, seem to be especially liable to become infected and therefore ought not to be employed on plague cleansings.

3. It will be observed that no mention has been made in the foregoing of aerial disinfection, *e.g.*, by burning sulphur. This is

because there is good reason to distrust the efficacy of such processes. The direct propagation of the disease by means of the atmosphere is limited and a room must be hermetically closed to allow of fumigation. It is best therefore not to attempt aerial disinfection.

4. All rags and dead animals found in the building should be burned. Dead animals, such as rats, should be soaked in kerosine oil previous to burning.

NOTE.—It has to be remembered that corrosive sublimate forms an inert compound with albumen, and to obviate this the solution should be acidulated. The Local Government Board of the United Kingdom therefore recommends that the solution be made as follows :—

“ Dissolve half an ounce of corrosive sublimate, one fluid ounce of hydrochloric acid and five grains of commercial aniline blue in three gallons of water. For convenient use, however, a saturated solution of the above quantities of 1 in 10 should be prepared and kept in bottles, so that each bottle when mixed with a bucketful of water—three gallons—will yield a solution of the required standard.”

The rule adopted at Bombay, which is simpler, but possibly less effective, is to add to the corrosive sublimate and water a handful of common salt and a few grains of aniline blue.

For a carbolic acid solution, enough soft soap should be added to ensure the thorough admixture of the acid with the water.

B.—Instructions regarding treatment of the excreta of Plague patients and of the drains in the neighbourhoods of Plague-infected buildings.

1. The excreta of plague patients should be mixed at once in a solution of perchloride of mercury otherwise known as corrosive sublimate (1 to 1,000 parts of water). Where feasible a portion of this solution should be placed in the pan before use, and a small quantity of it should be left in the pan after each cleaning.

2. The best method of disposing of excreta is by incineration and where quantities are small, this may be feasible if a sufficient quantity of saw dust is added.

3. But ordinarily the most easily practicable method of disposing of the excreta is to bury them with at least two feet of earth above them, at distance from habitations. Every precaution should be taken while removing them.

4. All drains in the locality of the plague-infected dwelling should be thoroughly washed down with a liquid disinfectant. The best disinfectant for the purpose is corrosive sublimate (1 to 1,000 parts of water) ; or failing this, carbolic acid (1 to 10 parts of water), or phenyle.

5. Latrines should daily be treated in the same way, and after the application of the liquid disinfectant it is advantageous also to sprinkle Macdougall's powder over every part.

C.—Instructions regarding the clothes and bedding of Plague patients, of persons who have been in attendance or in close proximity to them, and of persons who have carried or disposed of Plague corpses.

1. The clothes and bedding of plague patients should be burned.
2. The clothes of persons who have been in proximity to plague patients or plague corpses should be thoroughly boiled. Bedding which has been in close proximity to plague patients should be similarly treated. But razais of quilted cotton, which cannot be boiled, should be burned.

D.—Instructions regarding disposal of Plague corpses.

1. Violation of religious and caste customs should be avoided; and quicklime should not be used with bodies which are buried if objections are raised to this by any person interested, as it is not certain that it is efficacious.
2. Bodies which would in ordinary course be buried should be buried at least six feet deep.
3. Bodies which would in ordinary course be burned should be reduced as completely as possible to ashes.

E.—Precautions to be taken by nurses and attendants upon Plague patients.

1. In addition to the ordinary precautions taken in nursing an infectious case nurses and attendants should be warned that the poison is usually taken in through an abrasion, often most minute. The hands should constantly be cleansed in some antiseptic. Abrasions about the mouth and lips should be attended to. Male attendants should wear beards to prevent the risk of abrasion from shaving.

2. Before stooping over a patient to apply dressings or for other purposes the bedding should be thrown down for a few minutes to allow of the effluvia from the patient's body becoming diluted with the surrounding air.

APPENDIX V.

MEASURES IN THE CITY OF BOMBAY.

PAPER Nos.	CONTENTS.	PAGES.
1—2.	Appointment of a Plague Research Committee.	283—284 ^a
3—12.	Evacuation of infected localities in the City of Bombay	284—296
13—1.	4Establishment of a plague hospital at Govern- ment House, Parel, Bombay	296—298

APPENDIX V.

MEASURES IN THE CITY OF BOMBAY.

Appointment of a Plague Research Committee.

- No. 1.** Resolution of the Government of Bombay, No. 4533, dated the 13th October 1896.

His Excellency the Governor in Council is pleased to appoint Surgeon-Major R. Manser, M.D., Surgeon-Captain L. F. Childe, M.B., and Dr. Nasaryanji Fakirji Surveyor, M.A., B.S.C., M.D. (Bom.), to serve with Dr. W. M. Haffkine and Mr. E. H. Hankin on a Scientific Committee to enquire into the nature and history of the disease, stated to be bubonic plague, of which a number of cases have occurred in Bombay City. Dr. Manser is appointed President of the Committee.

- No. 2.** Circular Memorandum of the Surgeon-General with the Government of Bombay, dated the 10th October 1896.

In accordance with the orders of Government the following gentlemen are appointed members of a Scientific Committee for the purpose of investigating the bubonic plague now existing in Bombay :—

Surgeon-Major Manser (President).

Surgeon-Captain Childe.

Professor Haffkine.

„ Hankin.

Dr. Surveyor.

The points for investigation will embrace everything on which reliable information may be obtainable as to the mode of origin and nature of disease, its communicability from one human being to another by infection, contagion, inoculation or otherwise; whether communicable from man to animals or animals to man; whether there is any connection between the disease and grain used as food; whether the grain is sound or otherwise; its period of incubation

(a) by direct inoculation or (b) when received by ordinary exposure to infection or contagion from a person suffering from the disease or articles of clothing, bedding, etc., used by the sick; the period during which patients apparently recovered may retain the power of infecting the healthy, etc. The suggestion of any special preventive or curative measures, which may be deduced as the result of these enquiries, and any other matters of practical or professional interest which may occur to any of the Committee. The Committee will meet at such times and places as may be appointed by the President for interchange of opinion, recording of work accomplished, division of labour and such other purposes as may be deemed expedient.

Evacuation of infected localities in the City of Bombay.

No. 45, dated Calcutta, the 19th January 1897.

No. 3.

From—J. P. HEWETT, Esq., C.I.E., Secretary to the Government of India, Home Department,

To—The Secretary to the Government of Bombay, General Department.

I am directed to forward, for the information of His Excellency the Governor in Council, a copy of a memorandum signed by some of the principal European and Native Medical Practitioners of the City of Bombay and Members of the Special Research Committee regarding the bubonic plague in that city and measures for arresting its progress. This memorandum has been presented to the Government of India by Surgeon-Major-General Cleghorn, Sanitary Commissioner with the Government of India, on return from his visit to Bombay which formed the subject of the telegraphic correspondence with the Government of Bombay cited in the margin. Dr. Cleghorn shares in full the views recorded in the memorandum.

Home Department telegram No. 1, dated 2nd January 1897. Bombay Government telegram, dated 4th January 1897.

2. His Excellency in Council will observe that the view is expressed that the bubonic plague now prevailing in the City of Bombay is under certain conditions only slightly contagious or infectious; that its incidence is largely due to local causes, and that the only effective way of dealing with the outbreak and of arresting the progress of the disease is to insist on the evacuation of houses in which cases of plague have occurred. The gentlemen who have signed the memorandum consider that there will be no difficulty in providing sufficient and suitable accommodation for people removed from infected houses,

and that it only requires the concurrence and sympathy of the leaders of the different sections of the community to render the plan proposed by them a success.

3. The Government of India regard this influential medical opinion that the plague is not at present either generally epidemic or contagious as of very great importance. The history of previous outbreaks of the disease shows, however, that it has a strong tendency to epidemicity. There has already been very grave loss of life in the population of the city, and the consequences to the trade of Bombay, already very serious, promise to be disastrous unless the plague can be speedily reduced. Should it assume a more severe epidemic form, the whole of India may be affected. The Government of India are, therefore, of opinion that there should be no hesitation in taking the strongest measures to prevent its spreading, even though they may be once distasteful to the people affected. The particular measures advocated in the memorandum, namely, the removal of all persons from infected houses and the thorough disinfection of those houses, appear to the Government of India to be well calculated to check the progress of the disease, and the vigorous action that has been taken to clean and disinfect the infected parts of the city having failed to arrest its progress, it appears to the Government of India to be necessary that they should be adopted. Dr. Cleghorn has also reported to the Government of India that the nature of the buildings in which a large proportion of the inhabitants of Bombay dwell, make it specially important to remove all persons from infected houses and to allow the officers of the Health Department to thoroughly cleanse and disinfect such houses. He points out that in the large and ill-lighted and ill-ventilated houses or chawls occupied by so many as 500 to 1,000 individuals means of disinfection and cleansing can only be effectually carried out by the complete evacuation of the tenement in which a case of plague has occurred.

4. I am to say that the Governor General in Council commends the suggestions contained in the memorandum to the earnest attention of the Government of Bombay, and trusts that the Governor in Council may find it possible to act upon them. Should the Government of Bombay concur in thinking that the removal of all persons from infected houses is the best practical method for checking the progress of the plague, The Governor General in Council will be glad to learn in due course the measures which are adopted to bring the plan into general effect.

It will no doubt commend itself to the Government of Bombay that convenient temporary accommodation suitable to the families to be

removed should be got ready before measures for evacuation are taken. It seems to the Government of India desirable that, unless the Governor in Council sees objection to this course, the memorandum should be made public. The Government of India would be also glad to know whether the Government of Bombay consider it necessary to strengthen the building regulations of the city and to take increased power to prevent overcrowding in the chawls.

5. Dr. Cleghorn has suggested that two of the Deputy Sanitary Commissioners serving under the Government of Bombay should be placed at the disposal of the Health Officer free of cost to the Corporation. I am to request that this suggestion may receive the consideration of His Excellency in Council.

6. In conclusion, I am to say that the Governor General in Council has learnt with the greatest satisfaction of the untiring energy which has been displayed by the local authorities in the thorough and systematic cleansing and disinfection of the infected parts of the city. The liberal measures sanctioned by the Corporation towards these ends, and the energy displayed by the executive officers of the Corporation, *vis.*, Mr. Snow, Municipal Commissioner, Brigade-Surgeon-Lieutenant-Colonel Weir, Executive Health Officer, and Mr. James, Executive Engineer, and their subordinates, are appreciated by the Governor General in Council as they are no doubt also by the Government of Bombay. It is, in the opinion of the Government of India, only by continuing and extending these efforts unremittingly, and by supplementing them by even stronger measures such as that which is suggested in this letter, that the spread of the disease can be successfully and effectively arrested.

Note by Surgeon-Major-General Cleghorn, dated 16th January 1897.

No. 4.

I beg to submit copy of a note signed by those medical practitioners of Bombay who have had the greatest opportunities of becoming practically acquainted with the present outbreak of bubonic fever, and along with it, to prevent any future misrepresentation, a memorandum of the remarks I made to those gentlemen before I submitted the note for their approval and signature.

The proposal now submitted is quite a practicable one, more especially if the leaders of the different communities would interest themselves in the matter and explain to those communities the necessity for the adoption of the recommendations. It is feared that if compulsory evacuation of infected houses is carried out, more especially in the case of Muhammadans, that there will be an outbreak; this is the

prevailing feeling among the natives, and it was suggested to me that if His Excellency the Governor could admit several of the chief mullahs to a private interview, the matter could be easily arranged.

• The Corporation have practically conferred full powers on Mr. Snow, the Municipal Commissioner, and his executives, represented by Dr. Weir, Head of the Health Department, and by Mr. James, the Executive Engineer, have carried out their different duties vigorously and systematically, and at the same time have exhibited great tact in doing so.

The feeling of the native population has been decidedly against the sanitary measures enforced until a short time ago, when it has veered round, and the people are now willing to allow that benefit has resulted from those measures.

It would greatly strengthen the hands of the Health Department if His Excellency the Viceroy stated that he was pleased with the measures taken by the Corporation and specially thanked Mr. Snow, Brigade-Surgeon Lieutenant-Colonel Weir and Mr. James for the exertions they have hitherto made. The whole city is now under the inspection of the Health Department. All latrines, drains and gullies are being flushed; houses, as far as possible, are being cleaned, disinfected and white washed, and in those parts of the city not drained, surface drains of excellent construction are being made in connection with the house pipes. The continuance and extension of this work should be insisted upon as being of the greatest importance, and it should be clearly understood that there is no salvation outside the adoption of sanitary measures. The efforts of the Health Department are to a certain extent frustrated by the difficulty they find in cleansing and disinfecting inhabited houses, as this can only be effectually carried out in the case of rooms in which cases of plague have occurred, or in those which have been vacated by the tenants. The proposal now submitted of evacuating all houses in which a case of the disease has appeared will enable the Health Department to apply its measures to the house as a whole. The importance of this will be understood from a description of the houses. The chawls or tenements may run up to seven stories, and the unit of construction is a long corridor with rooms opening on either side. In the corridor, either at one end or in the centre, is situated a water-tap with bathing platform, and alongside it a latrine with two or three seats. The whole tenement is built up of a congeries of these corridors and rooms, and contains from 500 to 1,000 individuals. The only space between each tenement is a gully sufficiently wide to admit a sweeper.

In most of the corridors and rooms, either from the absence of openings or from the obstruction of the existing ones, there is absolutely no light admitted, and consequently no ventilation. The Health Officer informed me that he estimated that 70 per cent. of the population live in such houses. The corridors, before being taken in hand by the Health Department, were the repositories of filth of all kinds, and it is surprising that the mortality under such conditions has been so small. It shows, I think, that the disease, in the common acceptation of the terms, is only slightly contagious or infectious, and that its incidence is chiefly due to local conditions.

The importance of removal from the infected locality thus becomes apparent. Dr. Weir, the Health Officer, is now gradually trying to induce the inhabitants to vacate infected houses, and if generally carried out, he will require more assistance than at present. Under any circumstances, I do not consider that he has a sufficient number of officers for the supervision of operations, and I would recommend that the Government of Bombay should place at his disposal, free of cost to the Corporation, two of the Deputy Sanitary Commissioners serving under the Government of Bombay.

At the same time it should be suggested that the Sanitary Commissioner and one Deputy Sanitary Commissioner should proceed to Karachi and take over the arrangements connected with that city. The Health Officer is a native, and is, I am afraid, wanting in the necessary force of character and initiative.

The Government of Bombay should, I think, legislate in the direction of conferring powers on the Municipal Committee to regulate the building and construction of houses and to place a limit on the number of people inhabiting each room and house. Many of the former are now simply unfit for human habitation, and the sanitary arrangements connected with them are of the most crude and primitive description.

Memorandum on the Plague in Bombay by Medical Practitioners of Bombay. No. 5.

We, the undersigned Medical Officers and Members of the Special Research Committee, are of opinion that the bubonic plague now prevailing in the City is, under certain conditions, only slightly contagious or infectious, and the facts observed in connection with individual cases and those associated with the general progress of the disease, warrant us in concluding that its incidence is greatly due to local conditions.

We are emphatically of opinion that the only practical method of dealing with the outbreak and of arresting the progress of the disease is by the removal of the inmates from those houses in which a case of the disease occurs.

We quite appreciate the practical difficulties attending the adoption of this proposal, but in such an emergency as the present, these difficulties can and must be overcome. The Municipal Corporation will no doubt provide suitable huts, free of rent, for the accommodation of the different classes, and we understand that Mill Companies and other employers of labour are prepared to erect huts for their different employes. The experience gained in the melas at Allahabad and Hardwar will be available, as to the construction and arrangement of the huts.

There will thus be no difficulty experienced in providing sufficient and suitable accommodation for the evicted, and it requires only the concurrence and sympathy of the leaders of the different sections of the native community to render the scheme a success. If houses in healthy localities are available for occupation, there is no reason why they should not be utilized.

The steps leading up to removal would be the report to the Health Officer of a case by a duly qualified Medical Officer. The Health Officer would then notify the occurrence to the Municipal authorities, and would at the same time submit his recommendations for the removal of the inmates in the particular home and, if he considered it necessary of those also in the immediate neighbourhood. The Municipal authorities would then take the necessary action and indicate the huts available. Carts, if necessary, should be provided free of cost for the removal of the goods and chattels of the inmates.

The person attacked would either be removed to hospital or remain in the house with his or her relatives until recovery or death took place. The house would then be completely vacated and taken possession of by the Health Officer for purposes of cleaning and disinfection, and he should be invested with full powers, in consultation with the Executive Engineer, for removing all partitions, erections or portions of house walls which impede or obstruct ventilation. After an interval to be determined by the Health Officer, the house would be re-occupied.

There can be no question as to the necessity for the adoption of the measure we now advocate, and we trust that, in the interests not only of Bombay, but also in those of the whole of India, it will be at once accepted and acted upon, more especially as the untiring

energy displayed in the thorough and systematic cleaning and disinfection of the affected parts of the city has as yet failed to arrest the progress of the disease.

K. N. Bahadurji.

James Arnott.

Temulji Bhicaji Nariman.

Ismail Jan Mahomed.

Bhalchandra Krishna.

E. H. Hankin.

L. F. Childe.

Accacio G. Viegas.

N. F. Surveyor.

Thomas Blaney.

Henry Cook, M. D.,

Surgn.-Maj.-Genl.

James Cleghorn,

Director General,

Indian Medical Service.

T. S. Weir.

Sydney Smith.

I am of the opinion that, as there are facts showing that the plague is spread by people coming from infected localities, the measures compelling the inhabitants to leave those localities ought to be accompanied by others calculated to control their further movements.

W. M. Haffkine.

Telegram No. 388, dated Calcutta, the 9th February 1897.

No. 6.

From—The Secretary to the Government of India, Home Department,

To—The Secretary to the Government of Bombay, General Department.

My letter No. 45 of 19th January last regarding measures suggested by Dr. Cleghorn for suppression of plague in Bombay. Daily returns unfortunately show that the disease shows no signs of abating, and returns of deaths are now worse than ever. In view of gravity of situation, Government of India are constrained to press on Government Bombay the need for vigorous and immediate action and will be glad to learn what measures have been taken in pursuance of suggestions made by Government of India. They will be obliged if a reply can be sent to this telegram urgently.

Telegram No. 227-P., dated Bombay, the 10th February 1897.

No. 7.

From—The Secretary to the Government of Bombay, General Department,

To—The Secretary to the Government of India, Home Department.

Your telegram 388 of yesterday. Of the suggestions in your letter 45 evacuation of all infected houses and removal of people to temporary dwellings deemed impracticable if on large scale and carried out by force. All that is practicable being done by persuasion. Vigorous action being taken under section 426 of Municipal Act for

demolition of insanitary huts. Some already destroyed ; more about to be. Further measures of the most drastic kind will be taken under regulations drafted under Act III, 1897, and submitted to law officer before publication. Those regulations will provide for evacuation of infected houses, entry into deserted houses, for cleaning, etc., prohibition of further use of evacuated and deserted houses, summary reduction in overcrowding and closing of houses unfit for habitation. At present house-to-house visitation conducted vigorously in order to ascertain cases of plague, mark houses needing cleansing, etc., and such as are unfit for habitation. Paragraph 4 of your letter 45. Memorandum not published, because ascertained several signatories did not intend compulsory segregation of healthy, and publication would publicly misrepresent their real views regarding building regulations. Government do not doubt they need strengthening and are making provision to strengthen them, both temporarily by regulations under Epidemic Diseases Act, and hereafter permanently by amending Bombay Act III of 1888. Paragraph 5. One Deputy Sanitary Commissioner in Bombay, one in Thana District, one in Karachi, only two left for ordinary and famine work and to aid in repressing extension of plague to mofussil. Four doctors who were through plague in Hong-kong are coming out ; two extra commissioned medical officers are already assisting Health Officer, another assisting at European hospital, another assisting Port Health Officer ; others will be employed as they arrive.

No. 8.

Telegram No. 459, dated Calcutta, the 12th February 1897.

From—The Secretary to the Government of India, Home Department,

To—The Secretary to the Government of Bombay, General Department.

Your telegram 227, dated 12th. Government of India have learnt with regret view of Bombay Government on evacuation of all infected houses and removal of people to temporary dwellings. Situation is so grave and importance of vigorous action so manifest that they would desire Bombay Government to reconsider decision that evacuation of houses and removal to temporary dwellings on a large scale is impracticable. Experience now shows that outbreak will not be got under unless strongest measures are taken, and every day's postponement renders success less easy. The other measures which Bombay Government are taking will be of much use, but are not calculated to take the place of removal from infected houses to healthy locality. This course appears to Government of India to be only course left which gives prospect of getting plague under subjection. Bengal Government have published following rule for compulsory evacuation

infected premises under Epidemic Diseases Act :—*Begins.* When a case of plague occurs in any premises, the Chairman may, after giving reasonable notice, summarily cause such premises to be vacated and thoroughly cleansed and disinfected in such manner as may appear to him necessary, and may cause all articles which, in the opinion of the Health Officer, cannot be properly disinfected, to be destroyed. He may also in consultation with the Engineer of the Corporation, cause to be removed all partitions, erections or portions of house-walls which impede or obstruct ventilation. The premises shall not be re-occupied without the written permission of the Chairman. The Chairman shall provide the inmates thereof, when necessary, with temporary accommodation.—*Ends.* In order to carry out scheme first necessity is provision of sufficient temporary accommodation in healthy locality, and Government of India would be glad to learn what steps have been taken to provide this accommodation. It appears to them that experience at Karachi tends to show that if well regulated temporary accommodation is provided and executive and municipal authorities endeavour strenuously to carry out scheme on large scale, population will not be very difficult of persuasion.

Telegram No. 292-P., dated Bombay, the 13th February 1897.

No. 9.

From—The Secretary to the Government of Bombay, General Department,

To—The Secretary to the Government of India, Home Department.

Your telegram 459, 12th. Please see paragraph 9 of my letter 263-P. and Notification 228-P., 10th, in Government Gazette Extraordinary of same date, page 200-B.

No. 263-P., dated Bombay, the 11th February 1897.

No. 10.

From—J. D&C. ATKINS, Esq., I.C.S., Secretary to the Government of Bombay, General Department,

To—The Secretary to the Government of India, Home Department.

I am directed to acknowledge the receipt of your letter No. 45, dated 19th ultimo, forwarding a memorandum signed by certain medical practitioners in the City of Bombay and offering certain suggestions for the consideration of the Government of Bombay. I am to say that the suggestions have been carefully considered by His Excellency the Governor in Council, who directs me to make the following observations in reply to your letter.

2. In the first place I am to say that His Excellency the Governor in Council has some hesitation in complying with the request that the memorandum should be made public, as it has been ascertained that many of the medical practitioners who signed it did so

on the distinct understanding that the removal of the inmates from those houses in which cases of plague occur was not to be effected by any measures of compulsion.

3. It is understood to be the opinion of the Government of India that such evacuation of houses should be enforced even in the face of ill-will and opposition. His Excellency the Governor in Council ventures to think, however, that neither the preliminaries necessary to carry out such a measure nor the probable consequences of doing so have been fully realized by Dr. Cleghorn or the Government of India. His Excellency is advised that, to give full effect to such a proposal, at the lowest computation, 30,000 persons belonging to different races, castes and creeds would need to be provided with temporary dwellings. There is no site within the limits of the Bombay Municipality which would accommodate a tenth of this number. Great difficulty has attended all attempts at the segregation of healthy inmates of infected houses hitherto made, and very limited success has been achieved. From the beginning of the outbreak of this disease it has been found that the native inhabitants of the city are very reluctant to leave their houses or to allow any member of their family afflicted with the disease to be taken away. Indeed their dread of the disease itself appears to be hardly so powerful as their horror of being removed from their houses. Ignorance and superstition prevent them from discerning either that removal to a hospital is good for the sick or removal to uninfected dwellings good for the healthy, and they are far more easily moved by fear of the Municipal and Police authorities than by any realization of the benefits that will accrue from a sensible course of action. It is estimated that not less than 300,000 persons have already fled from Bombay, moved so to do not only by fear of the plague but quite as much, if not more, by an unfounded and unreasonable fear of what might happen to them at the hands of the Police and Municipal authorities were they to remain.

4. The gentlemen who signed the memorandum have expressed themselves to the effect "that there will be no difficulty in providing sufficient and suitable accommodation for people removed from infected houses, and that it only requires the concurrence and sympathy of the leaders of the different sections of the community to render the plan proposed by them a success." In so doing they have failed to measure the force of the influences I have already described; they have forgotten that nearly all the chief leaders of the various communities have left Bombay; and they have failed to realize that there is not the space within the city for a large health camp.

5. An alternative scheme is to construct large health camps outside the city. This would take some months to accomplish, for both

materials and labourers are scarce ; the latter so scarce that it is with great difficulty that a sufficient number can be obtained for the cleansing and disinfecting operations that have been and are still being carried on in the city. Indeed it seems unlikely that any large camps could be constructed until so short a time before the setting in of the monsoon (when they would become unsuitable for habitation) as to make their construction of little practical use.

6. Again this Government are advised that nothing short of compulsion would induce the people to leave their houses, and even if driven out of them, they probably could not be induced to resort to the health camps. They would, it is believed, leave Bombay altogether and would present to the popular view the spectacle of a people driven by force from their homes. This, it is feared, could lead to but one result—a state of panic so intense that sweepers, scavengers and labourers alike would desert Bombay. This would be a disaster far greater than any that has yet befallen the city ; for trade would be paralyzed, shops closed, the docks and mills deserted and the Municipality left unable, not only to carry out any special measures of cleansing and disinfecting, but to conduct the ordinary sanitary necessities and conveniences of every-day life.

7. But great as would be the evil to Bombay, this is not the only unhappy result that would attend such a feeling of panic. The exodus has already necessitated precautionary measures against arrivals from Bombay in every part of this presidency ; it has led to the plague becoming endemic in Poona and in parts of the Thana District ; it has resulted in overcrowding by refugees from Bombay of many cities and towns, and it has made demands on the number of qualified medical practitioners available to Government that can with difficulty be met. Every addition to the number of refugees adds to the possibility of spreading the disease and to the difficulty of dealing with it should it break out.

3. I am to assure the Government of India that every precaution is taken short of measures that would, it is feared, lead to the panic and the evils I have described. The liberality of the Corporation and the energy displayed by Mr. Snow, Municipal Commissioner, Brigade-Surgeon-Lieutenant-Colonel Weir, Executive Health Officer, and Mr. James, Executive Engineer, and their subordinates are, as is surmised in paragraph 6 of your letter under reply, appreciated by this Government no less than by His Excellency the Governor General in Council, and it is a very great satisfaction to the former to find these efforts are so cordially acknowledged. But it is not only their energy that deserves notice ; it is the conviction of this Government as will be gathered from what I have written, that they have shown

sound sense. The measures taken may not have been so stringent as those that would, in a European city, have gained general support, but they are the most stringent that it was possible to undertake without almost certainly producing a calamity more serious and more widespread than the very terrible one that has now to be dealt with.

9. At the same time the segregation of the healthy and the evacuation of infected houses are recognized as desirable measures and are being and will be carried out in so far as is possible without leading to a general panic.

10. My telegram No. 227-P., dated 10th instant, has put you in possession of information regarding regulations to be framed for Bombay City under the Epidemic Diseases Act, 1897. A copy of these regulations will be sent to the Government of India as soon as they are published.

11. The question of strengthening the building regulations and taking enlarged powers to prevent overcrowding is one that is engaging the earnest attention of Government and will be made the subject of a separate communication to the Government of India.

No. 11.

Telegram No. 664, dated Calcutta, the 21st February 1897.

From—The Secretary to the Government of India, Home Department,

To—The Secretary to the Government of Bombay, General Department.

Government of India having carefully considered your telegram 292-P., dated 13th, and letter 263-P., dated 12th, regarding evacuation of plague-infected houses, regret that, while giving full weight to the opinions of the Local Government in regard to the disposition of the people, they are unable to accept view that considerations adduced in your letter show that it is impracticable to induce people to move from infected houses to healthy locality. This course has been strongly recommended by the medical adviser of the Government of India. It is only measure attacking root of evil which appears practicable, and experience in Karachi seems to show that it can be so introduced as not to offend the prejudices of the people and is effectual in holding disease in check. In Bombay, on contrary, returns show disease getting worse and worse notwithstanding large emigration, and continuance of epidemic in its present intensity is a standing menace to health of whole continent of India. Government of India have previously urged that necessary preliminary to adopting course is preparation of camp accommodation in healthy locality. Accommodation for all native quarters of town no doubt cannot be prepared at once, but accommodation to provide for those evicted from some of the areas in which disease is most virulent could be

quickly prepared, and fact that, as reported in your demi-official of 16th, plague is now most prevalent in villages in north part of island, should facilitate this being done. Governor General in Council therefore trusts that Bombay Government will at once take steps to provide accommodation such as that at Karachi, and will make systematic endeavour to remove to it people from infected houses beginning with the worst quarters. Government of India would not desire that measures should be taken which would cause panic or other of the evils described in your letter, but they have no apprehension that preparation of healthy accommodation will have any such effect, and they think that any difficulties in inducing persons in worst quarters to seek comparative safety in camp in healthy locality could be removed if necessity were quietly but firmly explained. Experiment having been started for worst quarters could then be extended. Government of India trust that Governor in Council will earnestly consider proposals in this telegram and will recognise that no time must be lost in at least making a serious endeavour to carry them out. They will be glad to be informed of the measures taken.

No. 446-P., dated the 23rd February 1897.

No. 12.

From—The Secretary to the Government of Bombay, General Department,
To—The Secretary to the Government of India, Home Department.

As an *ad interim* reply to your wire 664 of the 21st, I communicate following substance of a report by Snow on your similar telegram 459 of the 12th. On occurrence of plague and even previously gangs have lime-washed places, cut off water-supply, taken off roofs, etc., hence hundreds of houses vacated. These regularly treated and kept vacant. Simultaneously huts have been and are being erected and every effort made to get people into them. Huts will continue to be erected. It will be seen that your object of removing occupants from and disinfecting houses has been studiously prosecuted.

Establishment of a Plague Hospital at Government House, Parel, Bombay.

No. 461-P., dated Bombay Castle, the 23rd February 1897.

No. 13.

From—J. DE C. ATKINS, Esq., Secretary to the Government of Bombay, General Department,

To—The Secretary to the Government of India, Home Department.

I am directed to report as follows for the information of the Government of India. Some time ago Government House, Parel,

Bombay, with its subsidiary buildings and compound, was placed by His Excellency the Governor at the disposal of the Municipal Commissioner, Bombay, for any use he might think fit to put it to in connection with operations against the plague. Before the house was appropriated for any other purpose, Brigadier-General Gatacre, who commands the Bombay District, undertook, if funds were found, to organize and establish a hospital for plague patients therein. With the concurrence of the Municipal Commissioner this offer was accepted by the Bombay Government. Within a very short time General Gatacre has succeeded in organizing and establishing the hospital

Surgeon-Major Hewett,
Army Medical Staff.

Surgeon-Captain Thom-
son, Indian Medical Ser-
vice.

Assistant Surgeon Mul-
lins.

Two Hospital Assistants.

Military authorities.

and it is now in working order. Ward orderlies and attendants are supplied by volunteers from native regiments, nursing sisters from the St. Joseph's Convent at Bandora, and the Medical Staff as named in the margin has been lent to the Bombay Government by the

I am to express the grateful acknowledgments of His Excellency the Governor in Council to His Excellency Lieutenant-General Nairne for his assistance in lending the staff noted above, and I am to request that the arrangement may be confirmed by the Government of India.

3. The hospital will be of the very greatest use. It is already supplied with 150 cots, and this number may be added to later. To General Gatacre the thanks of His Excellency the Governor in Council are in a special degree due both for the offer of assistance and for the energy he has thrown into the undertaking. He spared himself no trouble, and the result will be an unquestionable benefit to the city.

4. The funds requisite for this hospital are being provided in the first instance by the Bombay Government; its management will be controlled by a committee consisting of—

Brigadier-General W. Gatacre, C.B.

Surgeon-Colonel Hughes, Principal Medical Officer, Bombay District.

Lieutenant Farwell, R.E., Executive Engineer, Military Works, Bombay District.

5. I am to add that His Excellency the Governor in Council anticipates great indirect benefit from a measure which brings the Military into touch with the Civil authorities in organizing measures for preventing the spread of the plague, for it is not improbable that the Civil authorities may before long be driven to seek considerable assistance at the hands of the Military.

No. 887, dated Calcutta, the 9th March 1897.

No. 14

From—J. P. HEWETT, Esq., C.I.E., Secretary to the Government of India,
Home Department,

To—The Secretary to the Government of Bombay, General Department.

I am directed to acknowledge the receipt of your letter No. 461, dated the 23rd February 1897, reporting for the information of the Government of India, the arrangements made for the establishment and maintenance of a plague hospital at Government House, Parel, Bombay.

In reply I am to say that the Governor General in Council is glad to confirm the arrangements and that His Excellency in Council has read with pleasure the acknowledgment of General Gatacre's services expressed by the Government of Bombay.

APPENDIX VI.

MEASURES IN THE BOMBAY PRESIDENCY AND SIND.

PAPER Nos.	CONTENTS.	PAGES.
1.	Report on Poona by the late Mr. W. C. Rand.	301—357
2.	Report on Sind by Mr. Wingate, Acting Commissioner.	358—410
3—5.	Other papers regarding Karachi	411—417
6—7.	General Remarks on the disinfection of Houses.	419—435

APPENDIX VI.

MEASURES IN THE BOMBAY PRESIDENCY AND SIND.

***Report on Poona by the late Mr. W. C. Rand.**

No. 1. I have the honour to submit, for the information of Government, a report on the measures that have been taken to suppress and prevent the spread of bubonic plague within the limits of the City and Suburban Municipalities of Poona and the Poona Cantonment. The operations against the plague are not concluded at the time of writing this report, which deals with the measures taken up to May 20th, 1897. My report is divided into 16 sections, the contents of which are specified below :—

- I.—Introductory.
- II.—The plan of campaign.
- III.—Work of the military search, disinfection and segregation parties in Poona City.
- IV.—Plague work performed by Municipal agency in Poona City.
- V.—Conservancy in Poona City.
- VI.—Work in Poona Cantonment.
- VII.—Work in Poona suburban limits.
- VIII.—Work in villages round Poona.
- IX.—Hospital.
- X.—Segregation camps.
- XI.—Plague and mortality statistics and death registration arrangements.
- XII.—Inspection of in-comers and out-goers.
- XIII.—Inoculation.
- XIV.—The troops employed.
- XV.—Financial.
- XVI.—Conclusion.

* The Appendices to this Report have not been printed.

I.—INTRODUCTORY.

The outbreak of bubonic plague with which I have to deal in this report is the first that has occurred in Poona within the memory of living man, while of the occurrence there of a similar epidemic in former times I am not aware of any authentic record. At the time of the present outbreak the disease was quite unknown to the inhabitants of this part of India.

2. There is little doubt that the primary cause of the plague epidemic from which Poona has suffered was the introduction from Bombay into Poona of plague-infected passengers and property. The causes which enabled the disease after its introduction to take a firm root in Poona were—

(1) the existence of insanitary condition which enabled the disease to find a home;

(2) the omission to take in due time the measures necessary to stay its progress.

3. I possess no reliable information of the date of the first coming of the plague to Poona. The first cases reported were those of two passengers from Bombay who were found at Poona railway station suffering from plague on October 2nd, 1896. Though persons suffering from plague may have and probably did come to Poona before that date, there is no reason to suppose that they came in considerable numbers, and for practical purposes the disease may be deemed to have first appeared at the beginning of October 1896. The first indigenous cases of plague which are known to have occurred were reported in Poona City on 30th December 1896. The disease spread rapidly over Poona in January 1897, by the end of which month it had taken a firm hold of the city.

4. The first measure adopted for the protection of Poona from the plague was the appointment of a medical man on September 30th, 1896, to watch passengers from Bombay at the Poona railway station. At the same time sheds were erected near the Sassoon Hospital for the reception of plague patients. There was at that time, however, no legal means of compelling sufferers to go to the sheds against their will. From October special attention was paid to the general conservancy of Poona City, but till January 1897 no application was made by the City Municipality for special powers to deal with the disease. At a meeting held on January 13th, 1897, the City Municipality took, into consideration the question of obtaining special powers under section 73 of Bombay Act, VI of 1873, for the suppres-

sion of the bubonic plague, and regulations under that section were finally sanctioned by the Commissioner, Central Division, for Poona City on January 29th. An Assistant Health Officer had in the meanwhile been told off for plague duty on the 25th of that month. At the beginning of February the Sanitary Commissioner for the Government of Bombay directed Surgeon-Captain Lloyd Jones to proceed to Poona and take charge of the office of the Deputy Sanitary Commissioner, Central Registration District, as he considered that an officer of some standing was required to assist and guide the Poona City Municipality in their efforts to put an end to the outbreak. His proceedings were approved in Government Resolution No. 689 of 9th February 1897, General Department, Surgeon-Captain Lloyd Jones having in the meanwhile arrived at Poona on February 8th. From that day till my arrival he exercised a general control over such operations as were in progress.

5. By Government Resolution No. 1134 of 10th February 1897, Revenue Department, I was appointed to be Assistant Collector, Poona, and to have charge of the operations against plague in Poona City. I assumed charge of my appointment on February 19th. My first duty was to ascertain the extent to which the disease had already spread. On examining the current death register of the Poona Municipality and the mortality returns for previous years, I discovered that the mortality of the city had been growing at an alarming rate since the beginning of January. I learnt that there was no abnormal sickness in the city other than plague, and I came to the conclusion that the epidemic was far more widely spread than the municipal returns of plague attacks and plague deaths indicated. In my letter No. 3 of 20th February 1897, to the Collector of Poona, I suggested that Collectors and Political Agents in the Bombay Presidency should be informed that bubonic plague was firmly established in Poona with a view to their dissuading persons residing in their charges from visiting that city. On the same day in my letter No. 6 to the Collector I pointed out that Poona had become a very dangerous plague centre and suggested the making of additional arrangements for the examination of passengers proceeding by rail from Poona to unaffected parts of India. Orders for the examination of passengers by rail at Dhond and Rajewadi were finally issued by Government in Government Resolution No. ¹²³⁵_{728-P.} of 6th March 1897, General Department.

6. After bringing the dimensions of the epidemic to the notice of higher authority, I engaged in the preparation of a scheme for eradicating the plague from Poona City, in which task I was assisted by Surgeon-Captain W. W. O. Beveridge, A.M.S., who was posted to

Poona as my special assistant for plague purposes by Government Resolution No. $\frac{1009}{480-P.}$ of 24th February 1897, and joined his appointment on 23rd February 1897. Up to the time of Surgeon-Captain Beveridge's arrival, the use of anything but civil agency for dealing with the epidemic had not been considered. That officer, however, who had had considerable experience of the plague in Hong-kong and the methods adopted there for stamping it out, formed a decided opinion that the help of soldiers would be desirable in Poona, especially for the purposes of searching for sufferers from the plague, their removal to suitable hospitals, and the disinfection of plague-infected houses. His views were embodied in a report dated 25th February 1897, which I forwarded to Government with my No. 54 of 27th February 1897. At the same time I submitted to Government a draft set of rules under Act III of 1897, which I considered would be needed if the plague was to be effectually dealt with in Poona City. The advisability of employing British soldiers to make house-to-house inspection in the cantonment as well as in the city was brought to the notice of Government in the Collector's No. 2465 of 28th February 1897. In that letter Mr. Lamb expressed the following opinion:—

The aid of the soldiers is needed because the men are available, they are disciplined, they can be relied on to be thorough and honest in their inspection, while no native agency is available, or could be relied on if it were.

7. It was finally decided that volunteers should be called for from the British and Native armies to assist in the work of stamping out the plague, and a committee was appointed by Government Resolution No. $\frac{1272}{765-P.}$ of 9th March 1897 for the purpose of carrying out under the orders of Government the measures to be taken to suppress and prevent the spread of bubonic plague within the limits of the City and Suburban Municipalities of Poona and the Poona Cantonment. Powers to enable the Committee to perform the duties entrusted to it were conferred by the same rules. Additions to and modifications in these rules have been subsequently made by Government Resolutions Nos. $\frac{1810}{1061-P.}$ of 2nd April, $\frac{2190}{1269-P.}$ of 24th April, $\frac{2306}{1861-P.}$ of 3rd May, and $\frac{2501-A.}{1388-A.P.}$ of 12th May 1897. The Committee as constituted on March 9th consisted of myself as Chairman, and Lieutenant-Colonel C. R. Phillipps, I.S.C., and Surgeon-Captain W. W. O. Beveridge, A.M.S., as members. On June 3rd, 1897, Lieutenant-Colonel Phillipps who had been obliged by ill-health to take leave to England, ceased to be a member of the Committee (*vide* Government Resolution No. $\frac{2081}{2293-P.}$ of 3rd June 1897).

8. Prior to the appointment of the Plague Committee, a General Plague Hospital had been erected at the Sangam to which the plague patients at the Sassoon Hospital had been removed. Considerable progress had been made in the construction of a general segregation camp on the Shankarshet Road and sanction had been accorded to the construction of plague hospitals by members of the Hindu and Musalman communities, and in the case of the latter community of a segregation camp as well. Surgeon-Major J. P. Barry, who had been appointed by Government Resolution No. $\frac{876}{346-P.}$ of 17th February 1897, to do duty in the city of Poona, had arrived on the 27th of that month and had been placed by me in charge of the general conservancy of the city and also entrusted with the supervision of segregation camps and plague hospitals.

9. As already stated the Plague Committee was invested with authority over Poona City, Poona Suburban Municipal district and Poona Cantonment. The area and population of each of these is given below :—

Name of district.	Area in square miles.	Population (by Census of 1891).	REMARKS.
Poona City ...	4.9	118,790	Includes persons travelling by rail.
Poona Suburban limits ...	3.75	7,506	
Poona Cantonment ...	4.25	35,094	
TOTAL ...	12.9	161,390	

In the accompanying map (Appendix I) the boundaries of these three districts are shown, and the situations of the principal places connected with the operations are indicated.

II.—THE PLAN OF CAMPAIGN.

Before describing the measures taken by the Plague Committee to perform its appointed task, measures which were perhaps the most drastic that had ever been taken in British India to stamp out an epidemic, it is advisable to give some account of the circumstances which in the Committee's opinion rendered them necessary.

2. By the end of February 1897 the bubonic plague had got a firm hold of the city of Poona. Spreading from Bombay where it had originated in September 1896 or earlier, it had established itself in Karachi, Bandra and other places as well as in Poona. The measures taken to dislodge it from places where it had once obtained a footing had been everywhere unavailing. In none of these places had the

compulsory segregation of the sick, much less of the apparently healthy, inmates of infected houses been systematically enforced. On the other hand, the large cities of Surat and Ahmedabad had been kept almost entirely free from plague, though they had been flooded with refugees from Bombay just as Poona had been. In Surat and Ahmedabad, however, the segregation of the plague-stricken had been enforced as far back as October 1896. There was, it is true, no Indian example of the suppression by strong measures of an epidemic of plague which had established itself in a large town, but the possibility of so suppressing the disease had been demonstrated at Hong-kong in 1894. It was certain that if the plague was not to be allowed to run its course but was to be stamped out of Poona, stringent measures would have to be taken.

3. It was moreover palpable to every one that the measures so far taken in Poona had been utterly unavailing to stay the course of the epidemic. The state of the city was one of panic. A large proportion of the leading men of the place had already left or were preparing to leave Poona on account of the outbreak. Several of the Municipal Commissioners and Honorary Magistrates were among the deserters. The majority of the Gujrathi and Marwadi traders were closing their shops and returning to their native countries. The mass of the people were as a natural consequence of their ignorance opposed to segregation either of the sick or of apparently healthy persons who had been exposed to infection. Most of the influential men left in the town declared themselves in favour of the principle of segregation, but their ideas on the subject were generally crude and few if any of them were reconciled to the application of it to persons of their own position in life. Another fact to be reckoned with was that a section of the Brahmīn community, including some of the most influential men in the city, were disinclined to support any measures that emanated from an official source, and were more likely than not to work against any operations that might be set on foot by Government to deal with the emergency.

4. An important factor too in the situation was the state of the labour market. Many labourers were leaving the town on account of the epidemic, and, owing to the panic that prevailed, those who remained could not be relied on to work regularly especially if there was an element of danger in the work to be done. It was therefore difficult to carry on limewashing and other measures of disinfection on a large scale with private labour. Under these circumstances it would have been unsafe to attempt to carry out any extensive operations against the plague without a disciplined and reliable agency. It

was of the utmost importance to crush the epidemic with the least possible delay, both to stay the great mortality that was taking place in Poona and to prevent the spread of the disease to the other towns of the Deccan, in none of which had it so far attained epidemic dimensions.

5. It was finally decided by Government, after consultation with the military authorities, that volunteers for plague duty should be called for from among the troops, British and Native, stationed in Poona and Kirkee. The call was readily responded to, and it was found that many more volunteers than were likely to be required were willing to come forward. A plague duty camp was accordingly formed at Parvati on the Sinhgad road, and 893 officers and men, British and Native, under the command of Major Paget of the Durham Light Infantry, were placed on plague duty on 12th March 1897. Of these, 122 officers and men were posted as guards at the hospitals and segregation camps and the remainder went into the Plague Duty Camp at Parvati. It had been contemplated to place a cordon of native troops round Poona to prevent the egress of the public during the operations, but the proposal was abandoned.

6. I will now describe the Plague Committee's plan of operations.

The measures which were chiefly relied on for stamping out the plague were three in number—

- (1) The removal of the plague-stricken to plague hospitals.
- (2) The removal of persons who were apparently healthy, but had been exposed to plague infection, to segregation camps.
- (3) The disinfection of houses and moveable property which had been exposed to infection.

7. For the first of these measures the requisites were properly equipped plague hospitals and a reliable agency for finding and removing plague patients.

The plague hospitals in use during the operations were five in number—

- (1) The General Plague Hospital at the Sangam.
- (2) The Mahomedan Plague Hospital on the Shankarshet road.
- (3) The Hindu Plague Hospital near the Lakdi Pul.
- (4) The Sassoon Hospital (for Europeans and observation cases only).
- (5) The Parsi Plague Hospital near the Rifle Range.

Of these the first and the fourth were under official management, while the second, third and fifth were managed by private individuals, subject to the control of the Plague Committee. The removal of all persons known or suspected to be suffering from plague to one or other of these hospitals was insisted on. For finding and removing plague patients to hospital, both military and civil agency was used. The military agency used consisted of search parties composed of soldiers working under the command of British officers, and attended by native gentlemen, lady searchers and medical officers. The duty of the search parties was to search periodically all houses and other places where sick persons were likely to be within the area subject to the Plague Committee in order to discover plague cases and unburied corpses. All sick persons found in the search were examined by a medical officer, and if he found or had reason to suspect that they were suffering from plague, they were forwarded to a plague hospital. Arrangements were made for the disposal of unburied corpses either by the friends of the deceased or by men told off for that duty. The civil agency used for the detection and removal of plague patients consisted of medical subordinates who were assisted by Municipal Inspectors and worked under European supervision. Their duty was to obtain information by all means in their power of the occurrence of plague cases within the local areas assigned to them, and to remove the sufferers to hospital.

8. For the reception of apparently healthy persons who had been exposed to plague infection there were four segregation camps—

- (1) The General Segregation Camp on the Shankarshet road.
- (2) The Mahomedan Segregation Camp on the Shankarshet road.
- (3) The Cantonment Segregation Camp near the Rifle Range.
- (4) The Parsi Segregation Camp near the Rifle Range.

The persons liable to be removed to a segregation camp were the inmates of buildings which were believed to have been occupied by sufferers from plague and also the inmates of buildings where it was believed that any death had occurred which had not been certified by a medical officer holding Her Majesty's commission or some other medical officer empowered by the Plague Committee to certify in that behalf to be due to some cause other than plague. Persons found in the company of a sufferer from the plague were also liable to be segregated. The period of detention in the segregation camps was ten days. Persons found at any time during that period to be suffering from plague were removed to a plague hospital. Segregation parties

composed of native infantry were appointed for the removal to the camps of the persons liable to segregation.

9. The work of disinfecting infected houses and their contents was carried out chiefly by military, but in part by civil, agency in Poona City. In Poona Cantonment and in suburban limits it was carried out entirely by civil agency. The troops employed on disinfection work were divided into fumigators and limewashers, all of whom worked under the command of British officers. Disinfection with perchloride of mercury and other chemicals as well as fumigation was performed by the fumigators, while the limewashers broke up floors and destroyed rubbish in infected houses in addition to doing the work which gives them their name. In Poona City disinfection was only carried out by civil agency in houses where plague cases had been discovered by the Municipal establishment. Little limewashing was done by civil agency in the city after the operations of the military commenced.

10. A warehouse was opened at a central situation in Poona City for the storage of the contents of houses from which the occupants had been removed to hospitals or segregation camps.

11. In addition to the operations against the plague which have been sketched above, efforts were made to keep the general sanitation of the whole area under the Plague Committee up to an exceptionally high standard, and special conservancy establishments were employed for that purpose.

12. To minimise the chance of disturbances when troops were engaged on plague duty in the city and cantonment, the streets were patrolled by native cavalry, and during a portion of the operations a main picquet of native infantry was stationed at a central point.

13. The Committee attached great importance to the punctual registration of all deaths that occurred, and employed special establishments both to register deaths and to prevent the secret disposal of corpses of persons whose deaths had not been registered.

14. As it was found that plague-stricken people were constantly removed from Poona by night, picquets and patrols of cavalry and infantry were placed on some of the principal roads to prevent their egress.

15. Towards the close of the operations the villages round Poona were searched in order to ascertain whether they were infected by plague.

16. Arrangements were made by Surgeon-Major Street in consultation with the Plague Committee for the medical inspection of all passengers arriving at or departing from Poona by rail.

17. A medical officer, who had been instructed by Doctor Haffkine, was specially deputed for the duty of carrying on inoculations with Doctor Haffkine's prophylactic lymph.

18. Plague operations in Poona City were retained by the Plague Committee under their immediate control. Colonel Newnham-Smith, Cantonment Magistrate, and Mr. A. H. Plunkett, C.I.E., were empowered to exercise within the limits of Poona Cantonment and Poona Suburban Municipality all the powers of the Plague Committee under Nos. 4, 5, 6, 7, 8, 9, and 14 of the rules published in Government Notification No. 1272-765-P. of 9th March 1897. The Plague Committee exercised, however, a general control over operations within those areas.

19. The work done by the members of the Plague Committee personally may be noticed at this point. The members of the Committee met almost daily (Sundays generally excepted) in March and April to confer on questions of importance connected with the operations. After April less frequent meetings were found to suffice.

20. I conducted the general correspondence, and managed the financial affairs of the Committee besides drafting the Committee's rules and standing orders. I daily superintended the work of the troops in the city and moreover exercised, as far as I could, a general supervision over all branches of the Committee's administration. Lieutenant-Colonel Phillipps, as long as his health permitted him, carried on the Committee's correspondence with the military authorities. He daily superintended the work of the military in the city and attended to all matters connected with the discipline and welfare of the troops, besides assisting his colleagues in the general supervision of hospitals and segregation camps.

Surgeon-Captain Beveridge held charge of the General Segregation Camp, and for part of the operations superintended the Mahomedan Hospital and Segregation Camp. He also worked with the military search parties daily as a medical officer, and in addition supervised the issue of disinfectants.

III.—WORKS OF THE MILITARY SEARCH, DISINFECTION AND SEGREGATION PARTIES IN POONA CITY,

The Search Parties.

A house-to-house inspection by military search parties has been one of the leading features in the Plague Committee's plan of operations, and to nothing in the campaign did they attach greater importance. Before the Plague Committee was constituted it had been

demonstrated by experience that there was intense aversion among all classes of the townsfolk to the removal of their plague-stricken relatives to hospital. Incredible shifts were resorted to to prevent the authorities from becoming aware of occurrence of cases. Plague patients were hidden in soft cupboards and gardens—anywhere in fact where their presence was least likely to be suspected. Medical attendance of any description was rarely obtained, as it was feared that the calling in of a medical practitioner might lead to the removal of the patient. As a rule the authorities only heard of a case of plague after the patient's death. It was hopeless to attempt to stay the course of the epidemic so long as the isolation of plague patients was not effectually carried out, and this, in view of the antipathy to the segregation of the infected which existed in Poona, could only be done by compulsory methods.

2. The main difficulty, apart from the question of agency in the way of the organisation of a house-to-house inspection, lay in the religious and social customs of the Hindus and Mahomedans, who between them make up nearly the whole of the population of the city of Poona. The religious customs of the Hindus forbade people of other races to enter their god-rooms and cook-rooms. The females of the better class of Mahomedan families were all *purdah* women. Among all classes of the population, except perhaps the very lowest, there existed an aversion to the invasion of their privacy, which is unknown in Western Europe. Again a systematic search of houses by military agency was a novelty in Poona, and was on that account likely to be regarded with distrust and alarm.

3. It was thought necessary that the burden of the search should be borne by British soldiers as they were the most disciplined and trustworthy agency that could be obtained, but it was at the same time recognised that owing to their ignorance of the language and customs of the natives, and the existence of customs and feelings among the latter which we were bound to respect, they could not be the only agency employed. It was accordingly decided that native gentlemen should be attached to the search parties to explain to the public the objects of the search, to act as interpreters between the soldiers and the public and to point out to the soldiers the portions of houses which custom forbade them to enter. It was also resolved that the search parties should be accompanied by ladies to search rooms occupied by *purdah* women. As far as possible ladies possessing some knowledge of disease were selected for this work.

4. To get volunteers from among the native gentry to accompany the search parties, I called a meeting at the Jubilee Technical Insti-

tute on the 11th March, when 51 volunteers were enrolled. The services of additional native gentlemen to accompany the search parties were advertised for on 12th March and again on 16th March.

The ladies who accompanied the search parties were, with the exception of three mission ladies who volunteered their services, paid employés of the Committee.

5. The manner in which the search was actually conducted will be learnt from the accompanying printed directions for searchers (Appendix 2). They were approved by the Plague Committee on March 24th, and thereafter to the end of the operations the search was carried on in substantial accordance with them. The directions in force when the operations commenced were on the same lines, but less detailed, and were found after a few days' experience to require amplification.

6. For the purposes of searches and other plague operations the city was divided in five sections, numbered I to V. Each section was divided into six divisions, distinguished by the letters A to F. The accompanying map (Appendix 3) shows the sections and divisions into which the city was divided.

7. The "directions for searchers" were published for the information of the public, as were the notifications contained in Appendix 4.

8. The work of the search parties in the city commenced on March 13th and ended on 19th May. In the first instance, only to search divisions, each consisting of ten parties of three British soldiers were employed. Each division was under the command of an officer and had a medical officer attached to it besides lady searchers. Each party was accompanied by a native gentleman. The officers commanding the search divisions were provided with maps on which the areas their men had to search were shown. In order that plague patients might not be removed before the arrival of the troops, no intimation as to what area was to be searched was given to the public. The streets in which the search took place were patrolled by cavalry. The only important complaint about the first day's work was that doors forced open by the troops were not reclosed. This difficulty was got over on subsequent occasions by attaching to each search division a few native troops with hammers and staples to fasten up doors after the searches. Search work was carried out by two divisions daily till March 22nd, from which date up to May 19th six search divisions worked in the city. From March 22nd onwards one of the five sections into which the city had been divided was searched daily. The six search divisions were distinguished by the letters A to F. They always worked in the local divisions of the sections that bore

corresponding letters on the plague map. It, therefore, happened that after the whole of the city had been once worked through, the search divisions did not have to go over ground with which they were unfamiliar. When the operations commenced, it took a search division about 4½ hours to search the area assigned to it, but the work was done much more expeditiously towards the close of the operations when the cases discovered were few in number and the men were familiar with their duties.

9. Up to March 22nd it was usually found possible to attach a native gentleman to each search party. When, however, the total number of search parties was increased to 60, it was impossible to do so, as the number of gentlemen who came forward for this duty seldom exceeded 20 on any day. Thereafter two or three native gentlemen usually accompanied each search division.

10. Of the six search divisions three were at first accompanied by European medical officers and the remainder by men of the Hospital Assistant class. The work of the latter, however, not being found to be very satisfactory, they were relieved of their duties and the European medical officers were placed in charge of two divisions each. The officers employed on this duty were Surgeon-Captain Beveridge, Surgeon-Captain Lloyd Jones and Surgeon-Lieutenant Kiddle. These officers were supplied with cash advances and had instructions to pay compensation for any articles belonging to plague patients that might be destroyed.

11. On May 4th the constitution of the search parties was altered from three British to two British and one native soldier. On May 13th the strength of each search division was reduced from 10 to 7 parties. It was found that even with these reduced numbers a search division could get through its morning's work more quickly than it had been able to do in the early days of the operations.

12. The work of the search parties as well as of the fumigation and limewashing parties was carried on every morning of the week except on Sunday. The troops usually had a march of from two to three miles from camp before they commenced work, which was started in the city at about 6-30 A.M. On one occasion an afternoon search was made. It was found, however, that search work twice a day was too much for the men, and the experiment was not repeated.

13. The house-to-house inspection was rendered difficult by the way in which buildings in the city were entangled together, often forming veritable mazes, and affording facilities to persons who knew the ground to avoid search parties. The darkness of many of the rooms in native houses made it necessary to search them by the light of a lantern.

14. In order that they might exercise proper control over their men, officers commanding search divisions were required to keep their search parties together under their own eyes as much as possible, the object in view being to prevent the men from loitering or getting into mischief.

15. The attitude of the inhabitants of the city towards the search parties was, on the whole, friendly, though people who had sick in their houses usually tried to conceal them. The Brahmin community was the only one whose behaviour towards the troops employed was generally unfriendly. In the Brahmin quarters the troops met with a good deal of obstruction, which, however, always stopped short of forcible resistance.

16. Of the native gentlemen who volunteered to accompany the search parties the majority did not attend regularly, and some did not attend at all. The following are the gentlemen who are reported by the officers commanding the search divisions to have rendered useful service :—

Professor S. Moulvi of the Deccan College.

Doctor Anant Bhavanishankar.

Nabab Abdul Ferozkhan.

Sirdar Bahadar Subhedar Major Shaik Esmail, late 7th Bombay Infantry.

Subhedar Major Shaik Umar Bahadur, late 10th Bombay Infantry.

Sirdar Bahadur Subhedar Rajanasu, late Bombay Sappers and Miners.

Subhedar Ramchandra, late 7th Bombay Infantry.

Subhedar Major Rattan Mehta, late 17th Bombay Infantry.

Subhedar Shalom Esmail.

Subhedar Vandehji Robinaji.

Of the gentlemen who have rendered the best service the majority are retired native officers. Professor Moulvi appears to have been specially useful in discovering concealed cases.

17. Of the ladies that accompanied the search divisions the following rendered valuable assistance :—

Miss Bernard.

Doctor Miss L. Bernard.

Doctor Miss Crawley.

Miss McIntosh.

Miss Dias.

Mrs. Goodall.

The two first named ladies belong to the Church of Scotland Mission, while the third is in charge of the Panch Howd's Mission Dispensary. All three ladies gave their services without remuneration, and I cannot speak too highly of the devoted work they did. Miss McIntosh who had had considerable experience of plague-nursing in Hong-kong, was an invaluable assistant to the search parties till April 18th, when she was transferred to the General Plague Hospital on nursing duty. Miss Dias and Mrs. Goodall, the former of whom is a local medical practitioner and the latter a monthly nurse, proved themselves reliable and energetic as lady searchers.

18. The result of the search work on each day of the operations is given in Appendix 5. From March 13th to May 19th 218,124 houses were searched, and 338 plague cases and 64 corpses were found. The houses in the city were searched on an average 11 times each. The sufferers from the plague were removed to hospital, and arrangements were made for the prompt disposal of the corpses. The full value of the work done by the search parties cannot be gauged by the number of cases they discovered. The institution of the search by the military had the effect of causing the public to give information to the municipal authorities of a large proportion of the cases that occurred, and in many instances even to take patients to hospital without official pressure having been exercised.

The Fumigation Parties.

19. The disinfection by fumigation or otherwise of infected houses and their contents was an essential part of the Plague Committee's scheme. Particulars of the constitution of the military fumigation parties and of the duties assigned to them will be found in the printed "Directions for Fumigators" (Appendix 6). These directions were framed by the committee and published for the information of the public.

20. When the operations of the military commenced on March 13th there were two fumigation divisions, each consisting of 10 parties and under the command of a British officer. From March 22nd, when the number of search divisions was increased to 6, the number of fumigation divisions was increased to 3. On April 1st the number of fumigation divisions was reduced from 3 to 2, and on April 9th from 2 to 1, the number and constitution of the parties in a division remaining unaltered. On May 6th the strength of the fumigation division was reduced to four parties, and on May 13th the strength was further reduced to two parties. On May 6th the

fumigation and limewashing divisions were put under the same officer.

21. Before the operations of the military commenced, a list was prepared of all the houses in the city in which plague cases or deaths from any cause had occurred since March 1st and which had not already been disinfected. All houses on this list had to be dealt with by the fumigators. Thereafter they were supplied daily with a list of houses from which fresh plague cases or deaths from any cause had been reported to the municipal authorities. In addition to the houses entered in these lists, all houses in which cases of plague corpses were found during the morning's search had to be disinfected.

22. The preparation of correct lists of houses for fumigation was found to be a matter of considerable practical difficulty. Persons who reported deaths at the Municipal Office constantly gave the address of the deceased incorrectly, thereby exposing an uninfected house to disinfection and its inmates to the inconveniences of segregation. To get over this difficulty Municipal Conservancy Inspectors were entrusted with the duty of verifying the addresses at which plague attacks and deaths had occurred. The work was indifferently performed by them and was accordingly made over to the Assistant Masters from the Poona High School, whose services were lent by the Director of Public Instruction. It was finally transferred to non-commissioned officers of the native infantry.

23. During the greater portion of the operations the fumigation divisions worked daily over the same local area as the search divisions. One or more fumigation parties accompanied each search division for the purpose of disinfecting any houses where cases might be found in the morning's search. The remaining parties of the fumigation divisions were employed on the disinfection of houses entered on the fumigation lists, and situated within the section of the city to be searched on the particular day. At the close of the operations, when the number of houses for disinfection was small, this arrangement was not strictly adhered to, and the fumigation parties were employed in whatever part of the city there was work for them to do.

24. It will be seen in the " Directions for Fumigators " that two alternative processes of disinfection were prescribed. In practice, however, it was found that most houses could not be made sufficiently airtight to admit of the fumigation process, and flushing with perchloride of mercury was the method of disinfection commonly adopted.

25. Appendix 7 shows the number of houses disinfected on each day of the operations.

The total number disinfected was 1,918, of which no less than 1,489 were disinfected before the end of March. The number of houses for disinfection naturally fell off as the epidemic decreased, and it was therefore possible to make frequent reductions in the numbers of the fumigation parties.

The Limewashing Parties.

26. Particulars of the constitution and duties of the limewashing parties will be found in the printed "Directions for Limewashers" (Appendix 8). These directions were approved by the Plague Committee on March 24th and were published for general information.

27. For the first few days of the operations by the military a limewashing party consisted of three European and one native soldier, and one cart containing limewash and implements was assigned for two parties. The constitution of the parties was as stated in the directions from March 22nd. In the first instance two limewashing divisions of ten parties each were employed. The number of divisions was, however, raised to three with effect from March 22nd. On April 1st three parties were added to each division. On April 8th the strength of the limewashers was reduced from three divisions of 13 parties each to one division consisting of 15 parties.

28. The number of houses or portions of houses limewashed on each day of the operations is given in Appendix 9. The total number limewashed from March 15th to May 19th was 3,068.

29. The limewashing divisions usually worked in the portion of the town in which the search and fumigation divisions had worked on the previous day. Officers commanding limewashing divisions were furnished daily with lists of houses for limewashing. All houses which had been disinfected, either by the military fumigation divisions or by the municipal staff, were included in these lists. Houses, which though not infected were found to be in a filthy state, were also included.

30. It was found, at the beginning of the operations, that rather too many articles were at times destroyed as rubbish. Orders were accordingly issued on March 26th to officers commanding limewashing divisions to visit, if possible, all houses to be limewashed and to decide what should be destroyed in each. It was also laid down that when property of any value to the owners was destroyed by limewashing party, the officer commanding the division should note the

approximate cost of replacing what had been destroyed in order that compensation might afterwards be paid. In practice nothing was destroyed after the first fortnight of the operations except in the presence of an officer.

31. When a house was limewashed, any property of value which it contained was usually handed over to the neighbours for safe custody. When this could not be arranged, which seldom happened, all valuables were sent to the Plague Committee's warehouse, where they were kept till claimed by the owners.

The Segregators.

32. The work of removing to the segregation camps the apparently healthy inmates of infected houses was performed by native infantry under the command of a British officer. A segregation party was present daily in the section of the city where the search divisions were working. The segregation of the inmates of houses where cases were found by the searchers was made in accordance with the instructions contained in the "Directions for Searchers" (Appendix 2). A more laborious part of the duty of the segregators, however, was the segregation of the inmates of houses where plague cases had occurred which had come to light otherwise than through the agency of the search parties, or where deaths had taken place which had not been certified by a commissioned medical officer to be due to some cause other than plague. The Segregation Officer, Lieutenant Owen Lewis of the 14th Bombay Infantry, was furnished daily with a list of such houses.

33. At the commencement of the operations segregation ceased to be carried out in the morning at the time when the search was going on in the city. It was found, however, that to avoid segregation the inmates of infected houses commonly absented themselves from home during the ordinary working hours. It was therefore found necessary in the later stages of the operations to vary the hours of work for the segregators from day to day. The work of the Segregation Officer was by no means easy, and it was often a matter of much practical difficulty to determine who should and who should not be segregated. Mistakes were made at times, but I am satisfied that segregation was on the whole conducted with discretion and tact.

IV.—PLAGUE WORK PERFORMED BY MUNICIPAL AGENCY IN POONA CITY.

The subject of the plague first came before the general body of the Municipality at a meeting held on 30th September 1896 when a discussion took place on a question asked by one of the members. No

resolution was passed on that occasion and no other business connected with the plague was brought before the Corporation till January 13th, 1897. Some action was, however, taken by the Municipal Executive in the meanwhile. On 30th September 1896 a medical man was employed at the Poona railway station conjointly by the Poona Suburban and City Municipalities to watch in-coming passengers from Bombay.

2. On 6th October 1896 the Managing Committee ordered that drains and gutters should be cleansed and flushed as a precautionary measure. These orders were carried out in the course of the month of October. On January 13th, 1897, the Municipality considered letters received from the Sanitary Commissioner and other officials on the subject of the plague, and resolved that the Managing Committee should, in consultation with the Sanitary Committee, make proposals for the approval of the general body regarding the measures to be adopted by the Municipality in the matter of the plague under section 73 of Bombay Act VI of 1873. At the same meeting an Assistant to the Health Officer was appointed, and the Municipality agreed to bear one-third of the cost of the plague sheds which had been erected at the Sassoon Hospital. On January 18th Municipality agreed to bear one-third of the cost of establishment and medicines for the Plague Hospital. The construction of a segregation camp on the Shankarshet road was commenced on 1st February 1897.

3. Regulations under section 73 of Bombay Act VI of 1873 were finally sanctioned for the City of Poona by the Commissioner, C.D., in his memorandum No. 252-P., dated 29th January 1897. A copy of these regulations is attached (Appendix 10). On January 25th Doctor Dhamdhare, the Assistant Health Officer, was put on pure plague work, and detailed instructions were given to him for dealing with plague cases and affected dwellings. Practically no attempt was made by him to remove the sick for the reason that all cases were systematically concealed and information of a plague case was only received after death. When such cases were found the infected houses were fumigated, cleared of dirt and rubbish and then whitewashed. Disinfectants were used over the dirty parts of houses, and wells belonging to the houses were treated with permanganate of potash. The clothes of the sick were burnt. All public wells in the city were treated by the Municipal staff in the same way as those belonging to infected houses. About 1,600 houses were whitewashed under the orders of the Municipality between 2nd February and 25th March.

4. Surgeon-Captain Lloyd Jones arrived in Poona on February 8th and undertook the supervision of the operations against the plague,

which so far had been entirely carried out by native agency. When he arrived the death-rate of the city was more than twice the normal, and the epidemic was daily increasing and becoming more virulent. There was intense opposition to anti-plague measures and no cases were voluntarily disclosed. Whenever a case was heard of, the house was visited and the sick person removed (generally by force) to hospital. On two occasions the opposition went so far that the persons removing the patients were mobbed and the cases rescued. The segregation of the apparently healthy inmates of infected houses was tried but failed almost entirely owing to the intense opposition of the people and the absence of a suitable agency to enforce it. Owing to other calls upon him the District Superintendent of Police was only able to supply 12 policemen for regular plague duty—a number wholly insufficient for the enforcement of measures which were distasteful to the general public.

5. Shortly after his arrival Surgeon-Captain Lloyd Jones commenced a house-to-house visitation with a view to the improvement of the sanitary condition of dwelling-houses. In the houses visited ventilation openings were made, and the drains were attended to according to the requirements of each case. Where necessary, the houses themselves were limewashed. Over 1,000 houses were examined by Surgeon-Captain Lloyd Jones personally in Raviwar Peth. He found in the course of his inspections that the Municipal staff was very inadequate; cesspools were not emptied for days in some cases, drains were clogged and almost all side-lanes formed a combined dust-bin and public latrine. There was little supervision over the Municipal subordinates.

6. During January and February the health establishment was considerably increased. On February 16th Doctor Benjamin Solomon was engaged as an additional Assistant Health Officer, while shortly afterwards Doctor Bhau Vithoji was engaged in a similar capacity. Four European Inspectors were taken on, while the numbers of Native Inspectors, mukadams and sweepers were largely increased.

7. On February 25th the city was under my orders divided into two sections for purposes of plague work, one section being placed under Surgeon-Captain Lloyd Jones and the other under Surgeon-Captain Beveridge. This arrangement continued till March 11th, when other duties being assigned to Surgeon-Captain Beveridge, Surgeon-Captain Lloyd Jones resumed charge of the municipal plague operations throughout the city. The work of searching for plague cases was then divided between the three Assistant Health Officers, each of whom had certain peths assigned to him. To the European

Inspectors were assigned the duties of fumigating and disinfecting houses, where cases of plague were discovered by municipal establishments, and of opening up houses that were badly lighted or ventilated. All houses in the following peths—Somwar, Mangalwar, Rastia, Kasba, Ganesh, Bhawani, Ganj, Vetal, Sukrawar, and Budhwar—have been examined by the Inspectors and opened up where necessary. Details of the work done by the Assistant Health Officers and Inspectors are shown in Appendices 11 and 12.

8. It will be gathered from Appendix 11 that the Assistant Health Officers were far more successful in their search for plague cases from 13th March, when the military house-to-house inspection commenced, than they had been previously. The reason of this is that when search by the military commenced, many persons voluntarily gave information of plague cases to the municipal authorities. Surgeon-Captain Lloyd Jones reports that the Assistant Health Officers and Inspectors have worked excellently and specially mentioned Doctors Solomon and Dhamdhere, Inspectors Curtis and Ryan and Mukadan Kalu.

9. I am of opinion that the work carried out under Surgeon-Captain Lloyd Jones' supervision had been very satisfactorily performed, and that this result is chiefly due to the zeal and conscientiousness he has himself shown in the discharge of his duties. The value of such work as the removal of 608 cases to the plague hospitals is obvious, while the improvement that has been effected in the ventilation of dwelling-houses should have a lasting effect upon the health of the city.

10. Of the Municipal Commissioners the majority have rendered little service in connection with the plague operations. On February 16th, 1897, the Municipality resolved that the wards of the city should be distributed among the members who should form committees to induce the public to send patients to hospital. This resolution had, however, no practical result. On March 16th, 1897 I, as Chairman of the Plague Committee, wrote to the President of the Municipality asking him to request the members to enrol ward visitors in the wards to which they belonged. The duties proposed for the ward visitors were—

- (a) to obtain information of the occurrence of plague cases in their wards ;
- (b) to induce the friends of plague patients to remove them voluntarily to hospital ; and
- (c) to accompany military search parties on days when the parties worked in the wards to which the visitors belonged.

Unfortunately nothing came of this suggestion.

The names of those gentlemen who rendered assistance to the military search parties are mentioned elsewhere. I may note here that Sardar Khan Bahadur Dorabji Padamji, President of the Municipality, has rendered good service to the public by administering a fund for the relief of sufferers from the plague.

V.—CONSERVANCY IN POONA CITY.

The Plague Committee have attached great importance to bringing the general sanitation of Poona City up to as high a level as circumstances permitted. The charge of the conservancy of the city was entrusted to Surgeon-Major Barry on February 27th, and it has remained with him ever since.

2. I am not able to write from personal experience of the sanitary condition of the city before the epidemic commenced. At the end of February, owing to the entertainment of special establishments for sanitary work, it was probably somewhat better than usual. The streets and some of the lanes and open spaces left little to be desired in point of cleanliness. In other respects, the conservancy of Poona was about up to the average standard of mofussil towns in Western India, and consequently far below what is required by public opinion in Western Europe.

3. The health of the city necessarily was and is largely dependent on the arrangements for the removal of sewage. In the western portion of the city a system of sewers was constructed in the time of the Peshwas. These sewers have not been superseded by any later improvements and are still in use. No plan of the sewerage system is in existence, and the course of many of the sewers is unknown. A large proportion of the branch sewers have been wholly or partially blocked for years. The eastern portion of the city is unsewered, and there a system of cesspools prevails. Surface-water is carried off by gutters which are usually covered with stone slabs. In parts of the city where there are no sewers nightsoil is removed from the privies by Bhangis who convey it in baskets to iron barrel carts which are kept as fixed stations in the city. It is carried in the carts to the nightsoil depot outside the city.

4. I do not propose to deal at length with the shortcomings of the Poona Municipality in the matter of conservancy which were brought to light in the course of our operations, but I will enumerate the principal ones :—

The post of Health Officer was held by a young Brahmin, L. M. & S., who was quite unfit for the place. The nightsoil carts were for the most part in imperfect repair. The stands where the nightsoil carts were kept were in an

offensive state. The number of carts employed for the removal of sullage water was insufficient.

Dust-bins were not emptied regularly, and rubbish was allowed to accumulate in open spaces.

The channels or *moris* leading from the privies to the sewers were usually more or less blocked. The sewers into which the *moris* led were many of them blocked.

The Bhangis as a class were out of hand, and neglected their duties owing to want of proper supervision. The low-caste quarters of the city were neglected.

There was insufficient supervision over the conservancy arrangements generally.

5. To improve the sanitary condition of the city the first essential was to provide an efficient supervising establishment. Accordingly 18 British privates with two non-commissioned officers were appointed Conservancy Inspectors. A respectable English-knowing native was attached to each of them as Sub-Inspector. During a portion of the operations a British officer was detailed to supervise them, subject to the orders of Surgeon-Major Barry. The incompetent Health Officer was discharged by the Plague Committee and Mr. George Guider, who has since done good work, was appointed in his place. As it was essential that the sanitary condition of the city should be improved without delay, considerable additions were made to all branches of the subordinate conservancy establishment.

6. Special attention was paid by Surgeon-Major Barry to the systematic flushing of privies, *moris* and main drains. The disinfectants used for this purpose were creosotive, and subsequently corrosive sublimate.

The work of the Bhangis was carefully supervised, and the regular removal of nightsoil from privies was enforced. Nightsoil carts were repaired as far as possible and efforts made to obtain new ones. None ready-made could however be obtained on this side of India. Open spaces and lanes as well as the main streets were systematically cleared of rubbish.

Steps were taken by the issue of notices under the Municipal Act and otherwise to get insanitary privies put into a sanitary condition.

7. The city having been brought into a fair state of cleanliness the special subordinate conservancy establishments were ordered to be discharged from May 16th. Twelve British non-commissioned officers and privates with an equal number of English-knowing special sub-inspectors were however retained.

8. I am of opinion that the measures taken had the effect of materially improving the sanitary state of the city of Poona, and that great credit for the results obtained is due to Surgeon-Major Barry. There can be little doubt that the city is now cleaner than it ever has been within the memory of living man, and this is probably one of the causes that has kept down the general mortality.

9. Some particulars of the conservancy work done during the time the military inspectors were employed will be found in Appendix 13.

VI.—WORK IN POONA CANTONMENT.

The importance of taking stringent measures to check the spread of the plague was recognised by the Poona Cantonment authorities long before indigenous cases of the disease had appeared in the cantonment. The matter was referred to higher authority and finally the General Officer of the Bombay Command, with the sanction of the Government of India, prescribed for Poona Cantonment the temporary regulations contained in Appendix 14. These regulations were published by the Cantonment Magistrate on 20th January 1897. Prior to this, however, special attention was paid to the whitewashing of houses and the cleansing and disinfection of sewers and drains.

2. Towards the end of January the General Officer Commanding at the request of the Cantonment Magistrate placed Surgeon-Major Donnet on special duty in the cantonment to make a house-to-house visitation and to supervise sanitary arrangements. This officer was attacked with plague in the performance of his duties and going on leave was succeeded by Surgeon-Captain Thacker, who has since been in medical charge of plague operations in the cantonment.

3. When the operations in Poona Cantonment were placed under the Plague Committee's control that committee, as already stated in section II of this report, delegated certain of its powers to Colonel Newnham-Smith, Cantonment Magistrate. Thereafter all plague measures of a routine nature were carried out under his orders, subject, however, to the Committee's general control. The removal of the plague-stricken to hospital and the segregation of the inmates of infected houses was systematically enforced.

4. Military search parties were employed in the cantonment from March 18th. In the first instance two parties of three British soldiers, each under a non-commissioned officer, were sent there. On March 22nd the number of search parties was increased to six. On April 9th, as the disease appeared to be increasing in the cantonment, two divisions of 10 parties each were sent there. Each party consisted of one British and two native soldiers, and the search divisions

were commanded by British officers as in the city. On May 13th one search division was abolished, and the search was stopped altogether on May 19th. The military search was conducted in the cantonment on substantially the same lines as in the city except that in addition to searching for plague cases the troops were employed on the destruction of rubbish found in the houses searched. Only some 20 cases of plague were actually discovered by the search parties, but search had the effect of causing prompt intimation of the occurrence of cases to be given to the authorities. When two divisions were working in the cantonment it was found possible to search daily all the bazaars and a large proportion of the bungalow compounds.

5. The troops employed in the cantonment are reported by Colonel Newnham-Smith to have performed their duties with tact, efficiency and zeal. They were accompanied on their rounds by women searchers and native gentlemen, most of whom were returned native officers. Of the women searchers, Misses F. and G. Smith of the Salvation Army are reported to have been "most useful and indefatigable." The following are the native gentlemen who did good work :—

Risaldar Pirkhan.

„ Budrudin Khan.

Subhedar Devising.

„ Cornelius Ramsay.

„ Syed Boodhan.

„ Syed Ebrahim.

„ Hoobdar Khan.

„ Shaikh Hoosman.

„ Shaikh Mahomed Husain.

„ Shaikh Ahmed.

„ Ramdoo.

Subhedar-Major Shador Shaikh Muccadum.

Subhedar Shaikh Hyatkhan.

Mr. Gangaram Bhau Mhaske.

Mr. Cursetji Byramji Kotwah.

Out of these, Risaldar Pirkhan and Subhedar Cornelius Ramsay, who continued to work with the search parties after cases of plague had occurred in their own families, and Mr. Gangaram Bhau Mhaske have been specially commended by Colonel Newnham-Smith.

6. The disinfection and whitewashing of infected houses was carried on by labourers who worked under the supervision of British non-commissioned officers. It was carried out on the same lines as in the city, except that the removal of a portion of the roof to admit

air and sunlight formed part of the process of disinfection. The removal to the segregation camp of the apparently healthy inmates of infected houses was effected by civil agency.

7. At the suggestion of the Cantonment Magistrate the General Officer Commanding appointed a committee consisting of the Executive Engineer, Military Works Department, Surgeon-Captain Thacker and Mr. John Graham, to visit plague-infected houses, report on their structural defects, such as want of ventilation, etc., and make recommendations regarding them. It is hoped that the work of this committee will result in an improvement in the health of the cantonment.

8. Two old Mahomedan burial-grounds in Sachapir Street known as Sachapir Wallee's and Kahsumali's were closed under the orders of the Plague Committee.

9. Particular attention was paid to the whitewashing of houses throughout the cantonment. Mrs. Duncan was kind enough to raise a subscription for the relief of sufferers from the plague. The money raised was distributed through the cantonment authorities to poor persons who had suffered through the destruction of their property or otherwise.

10. Plague operations were carried on in the cantonment with a success and with an absence of friction that reflect the highest credit on Colonel Newnham-Smith. He was ably seconded by Surgeon-Captain Thacker who, in addition to diagnosing suspected cases of plague that occurred in the cantonment and performing the duties already referred to, was employed on the medical examination of corpses and the supervision of the cantonment segregation camp and the Parsi hospital and segregation camp. Colonel Newnham-Smith has also spoken very highly of the assistance he received from Mr. M. H. Dastur, his executive officer, who is reported to have been instrumental in detecting a large number of cases of plague. Sergeant Gordon, Superintendent of Conservancy, and Mr. Cowasji Barjorji, bullock contractor, have also been specially commended for their services.

VII.—WORK IN POONA SUBURBAN DISTRICTS.

The first step taken to prevent the ingress of the plague into Poona was the institution of a medical inspection of passengers at Poona railway station, which is situated within the limits of the Suburban Municipality. This matter is dealt with in another section of the report.

2. Towards the commencement of December the Suburban Municipality undertook the cremation of the bodies of people dying of

plague, where caste customs permitted such disposal of the dead. An establishment was engaged for the cremation work and a cart was provided for removing dead bodies. For the villages of Yerrowda, New Kirkee and Sangamwadi, which are within suburban limits, a shed was erected about half a mile to the east of Yerrowda for segregating the inmates of houses where plague cases occurred.

3. On an increase occurring in the number of imported cases of plague from Bombay, the Municipality engaged extra conservancy establishments to enforce and maintain cleanliness within the municipal district. All houseowners were required by notice to limewash their bungalows and out-houses. The servants' rooms and out-houses thus limewashed numbered 3,867. Printed notices were issued to house-owners and lodging and eating house-keepers not to take in persons arriving from Bombay and other infected areas. Printed notices of precautions to be taken against the spread of the plague and measures to be adopted on a case occurring were freely published and circulated. On March 21st the services of a native medical man, who had previously been employed on passenger inspection duty at the station, were retained for general work in connection with enquiries into causes of death and for taking part in house-to-house visitation.

4. As already stated in section II of this report the Plague Committee delegated certain of its powers to Mr. A. H. Plunkett, C.I.E., Chairman of the Managing Committee of the Poona Suburban Municipality, who, with the Committee's concurrence, practically had the entire management of plague arrangements within suburban limits.

5. Owing to the smallness of the number of cases that occurred within suburban limits, other than those found in the railway station and on the roads, the amount of disinfection that had to be carried out was not large. The roofs of 26 houses and rooms, in or near which cases of plague had occurred, were opened and their floors dug up. Forty-six houses and rooms were vacated and 31 were condemned as unfit for human habitation pending certain alterations. Thirty windows were made in 11 houses to admit of more light and air. Only 24 persons were removed to segregation camps.

6. House-to-house inspection with the assistance of British troops was commenced on the 22nd March and continued till the 19th May. During that period the search was carried on for three days in each week. One non-commissioned officer and nine privates were employed on the search. They were divided into four parties, each of which was accompanied by one or more Municipal Commissioners. The whole of the Municipal area was searched weekly, the work being carried on under the personal supervision of Mr. Plunkett. The instructions

issued by Mr. Plunkett for the guidance of the search parties are given in Appendix 15. One medical man, one lady doctor and two Muhammadan women accompanied the search parties. No plague cases were found in the search by the military, but it doubtless operated to prevent the concealment of plague cases. Mr. Plunkett has brought to notice the excellent behaviour of the British troops employed in the search. The work that devolved on them was performed with due regard for the caste customs and religious usages of the people whose dwellings were inspected, and gave him entire satisfaction.

7. The following gentlemen, who are members of the Suburban Municipality, rendered useful assistance in the search:—

Rao Saheb Balkrishna Shayana.

Mr. Abdulla Abdool Wahed.

„ S. Webbe.

„ Dadabhoy Sorabji.

„ Pestonji Romanji.

„ Balwantrao Hari Chiplunkar.

„ Bezonji Nasarvanji.

„ Dorabji Dadabhoy Butti.

Mr. Plunkett has also called attention to the good work done by the Municipal Secretary, Mr. Nowroji Mancherji Patil.

8. I consider that the operations against the plague within suburban limits have been conducted smoothly and satisfactorily and reflect the highest credit on Mr. Plunkett.

VIII.—WORK IN VILLAGES ROUND POONA.

Owing to the fact that many sick persons were known to have been removed from Poona to places outside during the prevalence of the epidemic in Poona City it was thought advisable that before the work of house-to-house inspection in the city was stopped the surrounding villages should be searched in order to ascertain how far they were affected. To enable this to be done Government were pleased to empower the Plague Committee, by Government Resolution No. ²¹⁹⁰ 1629-P, of 24th April 1897, to exercise the powers conferred on them by Nos. 5, 6 and 9 of the rules prescribed in Government Resolution No. ¹²⁷² 765-P, of 9th March 1897, throughout the Haveli Taluka of the Poona District.

2. Two search divisions, each consisting of ten parties composed of one British and two native soldiers, were formed for this search. The divisions were commanded by British Officers and were accompanied by Surgeon-Lieutenant Dove. The search commenced on

April 28th and continued till May 4th, during which period 31 villages and hamlets were visited. No cases of plague were discovered, and the search was accordingly discontinued after the latter date. The villages searched were found to be remarkably clean and the attitude of the villagers was invariably friendly.

IX.—HOSPITALS.

The number of hospitals at which plague patients were treated was five. The names of the hospitals with the date of admission of the first plague case to each are given below :—

Name of hospital.	Date of 1st admission.
Sassoon General Hospital	... 8th October 1896.
General Plague Hospital	... 5th February 1897.
Muhammadan Plague Hospital	... 8th March 1897.
Hindu " "	... 15th March 1897.
Parsi " "	... 13th May 1897.

None of these hospitals had been finally closed up to the end of May 1897. Of the first, the first two are under official management, while the remainder are privately managed, subject, however, to the supervision of the Plague Committee.

Sassoon General Hospital.

2. This is the General Hospital for the whole of Poona and is under the management of the Civil Surgeon. It was the only hospital to which persons suffering from plague could be sent when the disease first appeared in Poona. The first case was admitted on 8th October 1886 and was treated in the Contagious Ward.

3. As other cases began to come in, a letter was sent to the Executive Engineer on October 22nd, asking for the erection of a special shed for six patients in the hospital compound. A grass shed was accordingly put up in the hospital compound, and was in use from 29th October to the beginning of December.

4. The accommodation so provided proved to be insufficient and therefore a committee, composed of the City Magistrate, the Sanitary Commissioner and the Executive Engineer, met on December 8th to select a new site for plague sheds, as the hospital compound was being overcrowded. The Committee selected a site on the north side of the hospital on land belonging to the Great Indian Peninsula Railway Company. At the same time they recommended that sheds to hold 20 beds should be erected at once and a special extra establishment of one Assistant Surgeon and one Hospital Assistant besides menials engaged. New sheds for plague patients were accordingly erected on the site selected.

along with a shed for the Hospital Assistant's quarters, a dead-house and a privy, and the shed which had been in use in the hospital compound was transferred to the new site.

5. In consequence of the objection of the railway authorities to the treatment of plague cases at this site, the Poona Cantonment and the City and Suburban Municipalities finally agreed to build a plague hospital near the Sangam between Valentine Lodge and the Silk and Cotton Mills. When this hospital was opened on February 5th all the plague patients (18 in number) were transferred to it. The total number of patients treated in the Sassoon General Hospital and the plague sheds connected with it up to that date was 179, of whom 114 died, 10 absconded, 37 were discharged cured, and 18 were transferred.

6. After the opening of the General Plague Hospital at the Sangam all cases received at the Sassoon Hospital which showed definite symptoms of plague were transferred there at once, but doubtful cases which were received from the railway station and the cantonment were kept for observation. On April 28th the Plague Committee ordered that all cases for observation should be sent to the General Plague Hospital in the first instance. Since then a few cases of plague have been found among patients brought to the Sassoon Hospital and they have been promptly transferred.

7. The total number of cases of plague admitted to the Sassoon Hospital up to 20th May 1897 (including observation cases) was 238. Of these, 34 were found not to be plague cases and were discharged, while 204 persons were found to be suffering from plague; of these 40 were discharged cured, 117 died and 47 were otherwise disposed of.

8. The Sassoon General Hospital has been the appointed plague hospital for Europeans throughout the epidemic. Two European patients have been treated there, Surgeon-Major J. C. Donnet, A.M.S., and Mr. Kennedy, Sub-Editor of the *Deccan Herald*. Both were discharged cured.

9. Appendix 16 is a daily statement showing the result of the treatment of true and suspected cases of plague. Appendix 17 gives particulars of the men, women and children treated at the hospital. The small proportion of female patients admitted is noticeable.

10. The Civil Surgeon, Brigade-Surgeon-Lieutenant-Colonel McConaghy, has cordially co-operated with the Plague Committee, and I have much pleasure in acknowledging the help that we have received from him.

General Plague Hospital.

11. This hospital, which is situated near the Sangam, was built at the joint cost of the City and Suburban Municipalities and the Poona

Cantonment. It was opened on 5th February 1897, Mr. B. B. Darabshett, a local medical practitioner, being placed in charge of it. Surgeon-Major Barry was placed by me in supervisional charge of the hospital on 27th February 1897.

12. Full information as to the arrangements at the hospital will be gathered from the accompanying copy of his report No. 1-Y (Appendix 18). Further information relating to the hospital will be obtained from the appendices noted below.

Appendix 19.—Drawing of the hospital and its surroundings.

Appendix 20.—Daily statement of cases.

Appendix 21.—Statement of men, women and children treated at the hospital.

Appendix 22.—Statement of cases with groups of statistics.

Appendix 23.—Statement of superior establishment.

Appendix 24.—Statement of nurses.

Appendix 25.—Statement of establishment employed when the hospital was fullest.

Appendix 26.—Copy of the Plague Committee's rules relating to the hospital.

13. A plan of the hospital drawn to scale has already been submitted to Government with my No. 1063 of the 8th May 1887. One of the first duties of the Plague Committee was to arrange for the extension of the General Plague Hospital to accommodate the increased numbers of patients that were expected to be brought there. Again, during the month of May, a portion of the hospital had to be adapted to monsoon requirements, and monsoon accommodation for 75 patients was ordered to be provided. Works in connection with this hospital were carried out by the Public Works Department. It may be mentioned that the hospital with its burial-grounds at one time occupied an area of 15 acres and 2 guntahs.

14. Surgeon-Major Barry's report on the hospital is clear, and there is little in it that requires comment from me. I am not sure, however, that he is correct in saying that the labours of the European nurses were largely wasted. Of the value of their work from a medical man's point of view I am of course unable to express an opinion. From what I have seen with my own eyes I consider, however, that the attentions of the nurses were much appreciated by the patients.

15. The tabular statements relating to the hospital for the most part do not appear to call for remarks from me. I must, however, draw attention to Appendix 20 as showing the remarkable increase that took place in the number of admissions from March 14th, *i.e.*, from the time the military search parties commenced work. There is a

striking contrast in the number of admissions before and after that date, though there is every reason to think that there was more plague in Poona at the beginning than at the end of March. Nothing could show more clearly the value of the military search parties than this record of admissions to hospital. In explanation of the fact that the marked increase in the number of admissions occurred on the 14th, while the search by the military commenced on the 13th, I may mention that the hospital returns were made up to 6 A.M. daily and the returns for the 14th would include all persons admitted after 6 A.M. on the previous day.

16. I have much pleasure in acknowledging the valuable work done by Surgeon-Major Barry as Supervisional Medical Officer. The comfort of the patients was looked to in every way, a high standard of sanitation was maintained, and the discipline enforced upon the large staff of hospital subordinates was excellent. Surgeon-Major Barry has been ably seconded by Mr. Plunkett, by Doctor Darabshett, the medical officer in charge, and by Miss McIntosh, who has been in charge of the nursing arrangements since April 18th.

Mahomedan Plague Hospital.

17. This hospital was erected with my sanction by the Muhammadans of Poona, the funds for constructing and maintaining it being raised by voluntary subscription. It was managed by a committee, of which the leading spirit was Mr. Jaffer Jussuff, the well-known Commission Agent. The management was subject to the control of the Plague Committee. The committee of management admitted all Muhammadans to the hospital free of charge and provided them with free board and lodging while they remained inmates.

18. The hospital is situated on the north side of the Shankarshett road. It was composed during the hot weather of chapper huts divided into compartments, which were intended to hold one patient each. When the hospital, which was increased from time to time, reached its greatest dimensions, there was accommodation for about 50 patients, a number which was exceeded for the greater part of the month of April. At this time two patients often occupied one compartment. The compartments were covered matting and mattresses were supplied for the use of the patients. Cots were purchased for the patients who, however, did not take kindly to them. There was a plentiful water-supply.

19. Surgeon-Captain Beveridge was in supervisional medical charge of the hospital up to March 30th, when he was succeeded by Surgeon-Lieutenant Kiddle. The administrative medical charge of the hospital was held by a hakim named Ainudin and S. A. Rayman, a pensioned

hospital assistant. The treatment of the patients was entirely in the hands of the hakim who used native remedies only. The patients had the option of being treated by the hospital assistant, but none availed themselves of it. The hospital assistant was responsible to the Plague Committee for keeping the hospital in a sanitary condition. The supervisional medical officer did not interfere with the treatment of patients, but no case was allowed to be discharged till he was satisfied that a cure had been effected. A sufficient staff of subordinates was maintained.

20. Plague patients were allowed to have one relative with them in hospital, but there was no regular nursing. A guard of native infantry was kept over the hospital to prevent the entry of unauthorised persons.

21. At the beginning of April, when the Muhammadan Hospital was full, it was found necessary to direct that cases among Muhammadans found in the search by the military should be sent to the General Plague Hospital. This order was withdrawn at the end of the month when the numbers in the Muhammadan Hospital had fallen.

22. Appendix 27 gives particulars of the number of patients in hospital on each day, while Appendix 28 shows the general results of the treatment up to May 20th. From the latter statement it appears that out of 309 patients found to be suffering from plague 122 were discharged cured, 179 died and 8 remained under treatment. Of the persons shown as cured 48 were discharged within ten days of admission, and Surgeon-Lieutenant Kiddle considers that for that reason they could not have been true cases of plague. If he is correct in his surmise, the treatment was less successful than the figures in Appendix 28 indicate.

23. In the points of cleanliness and smartness the Muhammadan Hospital has compared unfavourably both with the General Plague Hospital and the Hindu Hospital. It has, however, been of immense value owing to the confidence it has enjoyed with practically the whole of the Muhammadan community. The majority of the patients admitted belonged to the poorer classes of Muhammadans. No one would have been surprised if this class of people had obstinately opposed the removal of their sick to hospital. So far, however, was this from being the case that a large proportion of the patients were brought in by their relations of their own accord. When the hospital was in danger of being closed for want of funds, the Plague Committee felt themselves justified in making a grant-in-aid towards its maintenance. The success of the hospital has been chiefly due to the efforts of Mr. Jaffar Jussuff who, besides collecting the funds necessary to finance it, has

paid constant attention to the details of the management, and has adopted, to the best of his ability, all suggestions made to him by the Plague Committee. I have no hesitation in saying that there is no native gentleman in Poona who has rendered services of equal value to Government and the public generally during the plague epidemic. Hakim Ainudin appears to have worked conscientiously and to have been trusted by his patients.

Hindu Plague Hospital.

24. The Hindu Plague Hospital was erected from the voluntary contributions with the sanction of the Plague Committee. It was situated to the west of Poona City beyond the Lakdi Pul. It consisted of rows of chappar huts divided into compartments, each of which was intended for the accommodation of one patient. The hospital was managed by a committee of Brahmins, subject to the control of the Plague Committee.

25. The hospital was opened to all Hindus except members of the low castes. Persons admitted were usually required to pay an admission fee of Rs. 10 and Re. 1 per diem for maintenance charges. Of 157 patients admitted 98 were Brahmins and 59 belonged to other castes. As in the other plague hospitals patients were allowed to be attended by one relative who lived on the premises.

26. The hospital was under the supervisional charge of Surgeon-Major Barry and patients were not allowed to be discharged without his authority. Mr. V. V. Bhagwat, L. M. and S., the visiting medical officer, directed the treatment of the patients. The chief part of the medical work was, however, done by two medical students who resided on the spot and took the place of hospital assistants.

27. Appendix 29 is a daily statement showing the result of treatment at the hospital. A summary of the results of the treatment will be found in Appendix 30. Further statistical information relating to the plague cases admitted is given in Appendix 31.

28. The sheds provided for the patients were comfortable, and the hospital and its surroundings were for the most part kept in a good sanitary condition. That the hospital was appreciated by considerable section of the Hindu population appears from the numbers that attended it. Surgeon-Major Barry's report on the management of the hospital is, however, generally unfavourable. The proportion of deaths to recoveries among true plague cases was higher, not only than at the Sassoon and General Plague Hospitals, but also than at the Muhammadan Hospital, where treatment on European methods was not in vogue.

Parsi Plague Hospital.

29. The Parsi Plague Hospital is situated on the side of the old Satara road beyond the Rifle Range. It was erected by the Parsi community at their own expense. The hospital is a substantial structure, rectangular in shape, roofed with corrugated iron and thatched. There are six commodious and well ventilated wards for plague patients with a bathroom attached to each. The wards are equipped in every essential particular. At right angles are situated the nurses' quarters, Hospital Assistants' quarters, dispensary, observation ward, etc., all of which are thoroughly furnished. Suitable arrangements were made for medical attendance and nursing. The hospital was under the supervisory charge of Surgeon-Captain Thacker, A.M.S.

30. Up to May 20th only one patient was admitted to the hospital. The solitary case was that of an old man who was admitted suffering from plague on May 13th and died on May 15th.

31. The hospital is a model one and reflects the highest credit on the Parsi community. That it has remained for the most part empty they would doubtless consider a matter of congratulation.

X.—SEGREGATION CAMPS.

The segregation camps were designed for the reception of apparently uninfected persons who had been exposed to plague infection. Removal to them was enforced under the powers vested in the Plague Committee by No. 6 of the rules published with Government Notification No. 1272—765-P. of 9th March 1897. The powers of the committee under that rule were subsequently extended by Government Resolution No. 1810—1264-P. of the 2nd April 1897. Segregated persons were liable to detention for a period not exceeding ten days.

2. The object of segregating the apparently healthy inmates of plague-infected buildings was twofold. First and principally, to prevent those of them in whom plague was in a state of incubation from developing the disease in private houses and becoming fresh plague centres : secondly, to insure the non-occupation of plague-infected buildings till the buildings had been thoroughly disinfected. Ten days was fixed as the maximum period of detention, as that was believed to be the longest term for which the malady commonly remained in a state of incubation in a human being.

3. The following segregation camps have been in use under the orders of the Plague Committee :—

The General Segregation Camp.

The Muhammadan Segregation Camp.

The Cantonment Segregation Camp.

The Parsi Segregation Camp.

The first two camps were situated near the Shankarshett road. The two last were situated by the side of the Old Satara road beyond the Rifle Range.

The General Segregation Camp.

4. The construction of this camp was commenced by the Poona City Municipality on February 1st. In the first instance eight blocks of huts containing 32 rooms were erected. On my arrival here I issued instructions for largely increasing the size of the camp. It was constantly growing till finally in the month of April it contained 122 rooms. The camp consisted of substantial chappar huts with mud floors. At the commencement blocks containing four rooms were constructed. Later on, however, blocks were built with only two rooms each, the object of the change being to diminish both the loss that would be caused in the event of an outbreak of fire in any block, and the house space to be disinfected in the event of the occurrence of a case of plague. The size of the majority of the rooms was 12 by 10 feet. A plan of the General Segregation Camp accompanies (Appendix 32).

5. Fifteen cook-rooms of corrugated iron were provided for the use of the inhabitants of the camp. There were 20 latrines, 12 for men and 8 for women.

6. The camp was abundantly supplied with water from a neighbouring draw well. A pump was fixed up at the well and an adjoining cistern was kept full of water for the use of the inmates. Bathing and washing platforms to which water was brought from the well by pipes were constructed within the limits of the camp. Rows of kerosine-oil tins filled with water were placed alongside all the huts for use in case of fire, and a municipal fire-engine was kept on the premises.

7. The camp was lighted by standard lamps which stood in rows between the lines of huts.

8. When I arrived at Poona so much of the camp as was then in existence was open to any of the inmates of infected houses that chose to come there. There was then no agency to compel people to come to the camp, and hardly any came there of their own accord. After my arrival and before the employment of the military on plague duty, I endeavoured to attract the inhabitants of plague houses to the camp by offering one free meal a day to every one in camp, and at the same time allowing the inmates to return to the city in the daytime to follow their ordinary avocations. Even this inducement failed to bring any considerable number of people to the camp, and I was forced to realise that a non-compulsory system of segregation was impracticable in Poona.

9. From March 13th, when the plague work of the military commenced, the segregation of the apparently healthy inmates of infected houses was systematically enforced. Appendix 33 is a daily statement showing how the inmates of the camp were disposed of from March 13th to May 20th. The following is a summary of that statement:—

Period.	Number of persons detained or admitted.	Have died.	Have been found free from plague and discharged.	Have been found suffering from plague.	Have been otherwise disposed of.
March 13th—31st ...	960	8	252	12	9
April 1st—15th ...	658	3	863	16	59
April 16th—30th ...	968	...	824	6	79
May 1st—20th ...	491	1	676	2	111
TOTAL ...	3,077	12	2,615	36	258

Five persons were in the camp on the morning of March 13th, and there were 161 inmates on the evening of May 20th.

10. Of the 12 deaths that took place 9 were due to plague. The number of persons shown as found suffering from the plague is exclusive of the plague deaths that occurred in camp before the sufferers could be removed to hospital. The persons shown as otherwise disposed of are chiefly persons who for some reasons have been allowed to leave the camp before the expiry of the ten days' period of detention.

11. The following table shows the number of days after admission to camp that the case of plague declared themselves. In this statement cases that ended fatally in camp are included:—

Number of cases.					Day of segregation on which they occurred.
1	...	...	...	...	1st day.
1	...	...	...	...	2nd "
1	...	...	...	...	3rd "
1	...	...	...	...	4th "
1	...	...	...	...	5th "
1	...	...	...	...	6th "
1	...	...	...	...	7th "
1	...	...	...	...	10th "
1	...	...	...	...	11th "

As regards the case that occurred after the tenth day, it may be explained that the patient's ill-health prevented his discharge when his ten days of detention had elapsed.

12. The General Segregation Camp was in charge of Surgeon-Captain Beveridge who visited it and inspected all the inmates daily, besides closely supervising the sanitary arrangements. His principal subordinates were the Superintendent, the native officer in command of the infantry guard, and the hospital assistant. Besides a native infantry guard a sufficient staff of clerks, water-carriers, cooks, bhangis, sweepers, lamplighters, and coolies was maintained.

13. A copy of the rules in force is attached (Appendix 34). Though the rules contemplated the grant of allowances for rations to members of the labouring classes only, as a general rule, it was found to be a matter of much practical difficulty to determine who should and who should not receive them, and in practice they were allowed to nearly all the inmates of the camp. There were three banias' shops within the encampment, which was visited daily by milk and vegetable sellers. Some members of the Hindu community, with the permission of the Plague Committee, opened an eating-house in the encampment, where such persons as desired it could obtain food ready cooked on payment.

14. Surgeon-Captain Beveridge is of opinion that apart from plague the general health of the inmates of the camp was good, and that segregated persons as a rule improved in condition during the period of their detention.

The Muhammadan Segregation Camp.

15. This camp was built and equipped at the expense of the Muhammadan community and was under the same management as the Muhammadan Plague Hospital, from which it was only a short distance away. It consisted of rows of chappar huts, which would comfortably accommodate one hundred persons. Sufficient latrines and cook-rooms were provided. The camp was under the supervision at first of Surgeon-Captain Beveridge and subsequently of Surgeon-Lieutenant Kiddle.

16. Appendix 35 is a daily statement showing how the persons admitted to the Muhammadan Segregation Camp were disposed of. Admissions took place from March 15th to April 16th and the camp was finally closed on April 22nd. The total number of inmates admitted was 302, of whom 255 were found free from plague and discharged, 2 were found to be suffering from plague, and 45 were otherwise disposed of. No deaths took place at this camp.

17. Two inhabitants of the camp, both women, were attacked with plague. One was admitted to the camp on March 20th and was attacked on March 22nd; the other was admitted on April 6th and was attacked on April 9th.

18. As at the General Segregation Camp the period of detention was ten days. Inmates were inspected daily by the supervising medical officer. Some of the inmates were provided with food by the Muhammadan committee of management, while others were kept supplied with food by their relations and friends.

The Cantonment Segregation Camp.

19. The Cantonment Segregation Camp consisted of three rows of 80-lb. tents, eight tents in each row, and could comfortably accommodate from 100 to 120 persons. Behind these were situated bathrooms, store-houses, etc., built of corrugated iron. Latrines of corrugated iron were also provided. As at the other camps the native infantry guard was accommodated in tents.

20. Appendix 36 is a daily statement showing how the persons admitted to the Cantonment Segregation Camp were disposed of. Inmates were first admitted on February 24th. Between that date and May 29th the admissions numbered 659. Of these 601 were found free from plague and were discharged, 6 were found to be suffering from plague, 26 were otherwise disposed of, and 26 remained in camp on May 20th. No deaths occurred at this camp.

21. The following statement shows the dates of admission and attack in the case of six persons who were found to be suffering from plague :—

Case number.	Date of admission to camp.				Date of attack.
1	9th March	...	...	...	9th March.
2	2nd April	...	...	...	3rd April.
3	5th April	...	...	...	5th April.
4	4th April	...	...	...	6th April.
5	6th April	...	...	...	7th April.
6	13th May	...	...	...	17th May.

It will be seen that no one was attacked later than four days after admission to camp. Persons found suffering from plague were despatched to the General Plague Hospital.

22. The usual period of detention at the Cantonment Segregation Camp was from seven to ten days, but in some instances inmates were discharged after shorter term.

23. Water was brought to within 200 yards of the camp by means of pipes and was conveyed into the camp by bhistis. The supply was of a sound, potable character, and was ample in quantity.

24. All the inmates of the camp were supplied with rations. The daily ration consisted of 2 lbs. of rice or flour, 3 ozs. dal, 2 ozs. ghi, 2 ozs. jagri, $\frac{1}{4}$ th oz. salt, chillies and tamarind, besides fresh vegetable. For Goanese and Eurasians, mutton, bread and vegetables were supplied.

25. On arrival in camp each person had a good bath, and was provided with fresh clothes and bedding. All clothes and similar articles brought to the camp were thoroughly disinfected by steeping for 30 minutes in carbolic solution or corrosive sublimate solution and placed in the sun to dry for five or six hours.

26. The inmates of the camp were regularly inspected by the medical officer. New admissions were kept separate from the other inhabitants of the camp for the first three days of the detention.

27. When a case of plague occurred the tent which the patient had inhabited was struck and placed in the sun for three days. The ground was well soaked with carbolic solution and chloride of lime in solution was sprinkled about.

28. The latrines were kept under close supervision and were attended to twice daily, the evacuations being disinfected before removal.

29. Surgeon-Captain Thacker reports that the inmates of the camp declared themselves much pleased with the treatment they received and expresses an opinion that they improved in health and general appearance during their sojourn there.

30. The camp was under the management of Surgeon-Captain Thacker and was well administered in every particular.

The Parsi Segregation Camp.

31. The Parsi Segregation Camp, which was situated alongside the camp last described, consisted of four large tents capable of accommodating from 40 to 50 people. It was provided with bath-rooms, a cook-house, a store-house and latrines. All were thoroughly suitable for their respective purposes. The camp was under the same management as the Parsi Plague Hospital which was situated on the opposite side of the road and was under the supervision of Surgeon-Captain Thacker.

32. Appendix 37 shows how the inmates of the camp were disposed of. Between March 27th, when the first admission took place,

and May 20th, 20 persons were admitted, of whom 18 were found free from plague and discharged, and two remained in camp on May 20th. There were no deaths or plague attacks. The period of detention was ten days.

XI.—PLAGUE AND MORTALITY STATISTICS.

Poona City.

The population of Poona City, according to the census of 1891, is 118,790. The area of the city is 4.9 square miles and 24,242 persons per square mile represents the density of population. For statistical purposes the population, according to the census of 1891, is throughout this report taken to be the population of Poona.

2. As a matter of fact, however, the population of Poona has fluctuated considerably between September 1896 and May 1897. Owing to the establishment of the plague in Bombay people from that city began to flock into Poona so far back as September 1896, and continued to do so till February 1897. On the other hand, an exodus from Poona set in towards the end of January when the plague had taken root in the city. It continued throughout February and the early days of March. In the second week of March, when it was known in the city that the military were to be employed to suppress the plague, large numbers of people left Poona. From the middle of March to the middle of April the exodus continued on a diminished scale. Towards the end of April the tide turned, and during the first-half of May there was a considerable influx of population. When the military operations ceased on May 19th the population of Poona was probably about what it was when they commenced on March 30th.

3. Estimates of the population at various stages of the epidemic are necessarily a matter of guesswork, a very large proportion of the egress having been by road, statistics of which are not available. I believe, however, that the maximum population was attained in the middle of January when there were probably not less than 150,000 people in the city. In the middle of April, when the population had reached its lowest point, the number of inhabitants probably did not exceed 80,000.

4. The first registered case of plague in Poona City, an imported one, occurred on 19th December 1896. Having regard to the numbers of plague patients found at Poona railway station during the previous 2½ months, it is probable that cases occurred earlier, but if they did, they were not reported to the municipality.

5. A statement of the daily plague attacks, plague deaths, and total mortality from December 1st, 1896, will be found in Appendix 38. The

monthly mortality of the city during the period of the epidemic is contrasted with the mortality in previous years in Appendix 39. Appendix 40 shows how the various castes and races have been affected by the epidemic. The following statement, which is an abstract of Appendix 38, gives statistics of plague attacks, plague deaths and total mortality for the 1st to 10th, 11th to 20th and 21st to the last day of each month:—

Period.	PLAGUE ATTACKS.			Plague deaths.	Total mortality.	Annual death-rate per mille represented on census population by total mortality.
	Imported.	Local.	Total.			
December 1st—10th ...	...	...	...	...	59	18
December 11th—20th ...	1	...	1	...	72	22
December 21st—31st ...	1	2	3	4	139	38
January 1st—10th ...	7	5	12	10	90	27
January 11th—20th ...	3	18	21	20	166	51
January 21st—31st ...	8	60	68	65	241	67
February 1st—10th ...	5	64	69	66	256	78
February 11th—20th ...	...	51	51	42	329	101
February 21—28th ...	2	81	83	64	424	163
March 1st—10th ...	1	245	246	202	615	189
March 11th—20th ...	...	399	399	241	517	159
March 21st—31st ...	...	453	453	313	524	146
April 1st—10th ...	...	337	337	218	328	100
April 11th—20th ...	1	165	166	132	206	63
April 21st—30th ...	2	88	90	66	109	33
May 1st—10th ...	...	29	29	22	59	18
May 11th—20th ...	1	20	21	16	53	16
TOTAL ...	32	2,017	2,049	1,481	4,187	...

6. From Appendix 39 it will be seen that the registered mortality was abnormally low in October and November 1896. It was slightly above the average in December, and largely so in January, February, March and April. In May it was again below the average.

7. There is little reason to doubt that owing to the exceptional dryness of the weather consequent on the early stoppage of the monsoon of 1896, the general health of Poona from October 1896 to May 1897 was, apart from the plague, exceptionally good. This fact being accepted, it will be evident from a perusal of Appendices 38 and 39 that the number of reported plague deaths does not wholly account for the largeness of the total mortality in the month of January, February, March, and a portion of April. The fact is that a large proportion of the plague deaths that have occurred in private houses have been falsely reported as due to other causes and registered accordingly by the municipal authorities.

8. The total number of plague deaths registered up to May 20th has been 1,481. A more correct idea can, however, be obtained of the number of plague deaths by deducting the average mortality from the actual mortality for each month and treating the balance as due to plague. The number of plague deaths reported after 20th April may be accepted as approximately correct. The following statement shows the plague mortality of Poona City as arrived at by this method :—

Month.			Average mortality of preceding five years.	Actual mortality in plague year.	Difference between columns 2 and 3.
1			2	3	4
December	...	...	261	270	9
January	...	...	261	497	236
February	...	...	225	1,009	784
March	...	...	244	1,656	1,412
April 1st to 20th	...	...	178	534	356
Add - Reported plague deaths from April 21st to May 20th				...	104
Total estimated plague mortality				...	2,901

9. The estimate of the total plague mortality thus arrived at is probably too low rather than too high. In the first place it has to be remembered that the general health, apart from plague, was good throughout the epidemic. Another cause that operated to keep down mortality during the period the military search parties were employed

was the removal of sick persons from the city into the surrounding villages. I believe that this practice did much to lower the general mortality of the city, and it certainly accounts to a great extent for the exceptional lowness of the mortality from causes other than plague during the period from 21st April to 20th May. Accepting 2,901 as the total plague mortality of the city,—and I think the figure is well within the mark,—we find that the plague claimed 24 per mille of the registered population as victims.

10. In tracing the progress of the epidemic it has to be firmly borne in mind that till the latter part of April our record of plague attacks and plague deaths was very incomplete. Evidence of its rise and fall must, therefore, be looked for in the variations in the total mortality, and in this connection we ask attention to the abstract of Appendix 38, which has already been given. From the last column of that abstract it will be seen that the recorded mortality rose steadily from the first period of December to the first period of March with only one interruption, and that there was a continuous decline in all subsequent periods. In connection with this it must be explained that before the plague operations came under European control the death registration was carried on very irregularly by the municipal staff. On the last day of each month a number of deaths were brought on to the register, which had been reported by the municipal subordinates and policemen, some of which had occurred weeks before. Further, deaths were not registered at all on days when the Municipal Office was closed, deaths which should have been registered on such days being brought to account subsequently. It is owing to these two causes combined that the registered mortality was lower in the first period of January than in the last period of December. I see no reason to believe that there was any real interruption in the increase in the mortality between the first period of December and the first period of March. Up to the middle of January that increase was assisted by a continuous increase in the population of the city. From the beginning of February it went on concurrently with a decrease in the population. The mortality from all causes reached its highest point on 10th March, when a fall set in.

11. It will be seen from the abstract that the total mortality in the second period of March was smaller than in the first period of that month by 98. This decrease is chiefly due to the fact that it got known in the city that house-to-house inspection by the military would commence on 13th March. During the few days before that date, thousands of people including many sick left Poona, which naturally had its effect on the mortality within city limits. The increase in the number of removals

to hospital which began, when the military search parties started work, cannot have had much effect on the mortality as early as 20th March. The small decrease in the mortality that occurred in the third period of March is, in our opinion, due to the plan of campaign beginning to take effect on the epidemic. After the end of March the decrease in the mortality was rapid, and by the end of April the plague was no longer of the dimensions of a severe outbreak. By 19th May, when the house-to-house inspection was brought to a close, the disease may be said to have become sporadic.

Poona Suburban Municipality.

12. The population within Poona Suburban Municipal limits, according to the census of 1891, is 6,706, exclusive of passengers enumerated at the railway station. The area is 3.75 square miles, and 1,788 persons per square mile, represents the density of population. A statement of the daily plague attacks, plague deaths and total mortality from 2nd October 1896 to 20th May 1897 will be found in Appendix 41. The monthly mortality during the period of the epidemic is contrasted with the mortality in previous years in Appendix 42. Particulars of the extent to which the various castes and nationalities were attacked is given in Appendix 43.

13. The following summary of Appendix 41 contains particulars of the plague and general mortality in each month of the epidemic:—

Month.	PLAGUE ATTACKS.			Plague deaths.	Total mortality.
	Imported.	Local.	Total.		
October	6	...	6	6	47
November	1	...	1	...	34
December	45	...	45	33	83
January	89	...	89	55	107
February	57	4	61	35	66
March	20	8	28	16	66
April	32	7	39	17	66
May, 1st to 20th	5	1	6	2	34
TOTAL	255	20	275	164	503

The first cases of plague occurred on 2nd October and were imported from Bombay. No local case occurred till 21st February, and the disease never took a firm hold of the suburban municipal area. The reasons of this probably were the absence of overcrowding and the comparatively good sanitary condition of the majority of the houses within suburban limits. Mr. Plunkett noticed that the majority of indigenous cases occurred in damp areas and near irrigation channels.

14. The bulk of the imported cases were those of persons found at Poona railway station to be suffering from plague. It is worthy of note that up to the end of February all the imported cases, 198 in number, came from Bombay. From Appendix 42 it will be gathered that the death-rate in ordinary seasons is extremely high in proportion to the population. This is due to the fact that the Sassoon Hospital, which is the general hospital for the whole of Poona, is situated within suburban limits. The abnormally high mortality that has prevailed since December 1896 is in great measure accounted for by the inclusion in the returns of imported plague cases which proved fatal. It is not believed that any considerable number of plague deaths have been registered as due to other causes in suburban limits.

Poona Cantonment.

15. The population of Poona Cantonment, according to the census of 1891, is 35,094. The area is 4.25 square miles, and 8,257 persons per square mile, represents the density of population. A statement of the daily plague attacks, plague deaths and total mortality from 1st December 1896 to 20th May 1897 will be found in Appendix 44. The monthly mortality during the period of the epidemic is contrasted with the mortality in the corresponding months of previous years in Appendix 45. Particulars of the extent to which the various castes and nationalities were attacked is given in Appendix 46. The following summary of Appendix 44 contains particulars of the plague and general mortality in each month of the epidemic:—

Month.	PLAGUE ATTACKS.			Plague deaths.	Total mortality.
	Imported.	Local.	Total.		
December ...	...	...	...	...	36
January ...	3	...	3	...	57
February ...	2	5	7	4	67
March ...	9	63	72	44	97
April ...	11	75	86	64	107
May 1st to 20th ...	...	20	20	18	47
TOTAL ...	25	163	188	130	411

16. In addition to the cases shown above one imported plague case occurred on November 12th and proved fatal. Including this case the total recorded plague mortality within cantonment limits was 131. No local case of plague is known to have occurred before 9th February 1897, and it was only in the month of March and April, after the adjoining parts of Poona City had become badly affected, that the cantonment suffered at all severely from the epidemic. The greater part of the Poona Cantonment is occupied by military lines and bungalows, where a filth disease like plague would not be expected to gain a footing. The bazar portions of the cantonment are, however, thickly populated, and it is there that the majority of the indigenous cases of plague occurred.

Death Registration arrangements.

17. The registration of all deaths that occurred was a point to which the Plague Committee attached the utmost importance. The subject was one which had not received the attention it deserved in Poona City up to the time of the appointment of the Plague Committee, and the bye-law relating to the giving of information of deaths by the people had not been enforced by the Poona City Municipality. In practice information of the occurrence of deaths used to be collected by the road-sweepers who were paid a quarter of an anna for every death reported at the Municipal Office. The ward mukadams and inspectors had orders to check the information so obtained, and police constables on duty in the city had orders to collect information about domestic occurrences to serve as a check on that collected by municipal agency. During the five years 1891-92 to 1895-96 the registered mortality had been at the rate of 27 per mille on the census population of 1891, and it is likely that about one quarter of the deaths occurred used to escape registration.

18. Nos. 17, 18 and 19 of the rules published in Government Notification No $\frac{1772}{765-P.}$ of 9th March 1897 gave the Plague Committee power to enforce more accurate registration of deaths than had hitherto taken place. From the time the military operations commenced, registration clerks were kept on duty from 6 A.M. to 10 P.M. daily within city suburban and cantonment limits to register deaths of which information was given under rule 17 and to grant certificates of registry. At the same time mukadams were posted at the principal burning and burial grounds with orders to collect death registry certificates from funeral parties, and to hand over a member of the funeral party to the police if no certificate was forthcoming. Instructions were given to all policemen on duty to examine the certificates of all funeral parties which passed them and to detain a member of the party when no certificate was forthcoming in order that inquiries might be made as to

where the death had taken place. The arrangements made were duly notified to the public.

19. The startling decrease which took place in the mortality of Poona City during the month of April led the Committee to entertain a doubt whether deaths were not escaping registration. Accordingly, with a view of increasing the efficiency of the death registration arrangements, a British officer was placed in charge of them from April 26th. The actual work of death registration was entrusted to native officers, and the mukadams stationed at the burial and burning grounds were replaced by men from the native infantry. Sowars were told off to inspect daily the smaller burial-grounds where it was not worth while maintaining permanent posts. I am confident that since these changes have been made very few deaths have escaped registration, while the number that went unregistered before April 26th was probably inconsiderable. The arrangements made for verifying the addresses at which deaths occurred have been noticed in describing the work of the fumigation parties.

20. In suburban and cantonment limits, where the death-rate never reached the height it did in the city, arrangements for the medical examination of corpses of persons who died in places other than hospital were made at an early stage of the operations. This had the effect of keeping down the number of houses which had to be disinfected and their inmates segregated, since when the examination showed that death was not due to plague disinfection and segregations were inapplicable.

21. In the city, owing to the calls upon the time of the medical officers employed, a system of medical examination of corpses was not introduced till May 19th, when the work of the search parties stopped. Since that date it has been performed by Surgeon-Captain Beveridge, and has had the effect of saving the public from much inconvenience. A copy of the notification which was issued regarding the medical inspection of corpses is given in Appendix 47.

22. By this system of inspection of dead bodies by a medical man, combined with efficient death registration arrangements, it is improbable that any considerable number of deaths from plague can escape the notice of the authorities, and the enforcement of disinfection and segregation in all doubtful cases which it renders possible should go far to prevent a recrudescence of the epidemic.

XII.—INSPECTION OF IN-COMERS AND OUT-GOERS.

This subject may conveniently be dealt with under two heads—inspection at railway stations and inspection on roads.

Inspection at Railway Stations.

2. In consequence of the appearance of plague in Bombay, the Managing Committee of the Poona Suburban Municipality resolved, on the 29th September 1896, to post a medical man at the Poona railway station to watch passengers arriving from Bombay by railway and to send any found to be suffering from plague to the shed provided for the purpose in the Sassoon Hospital compound. A medical man was accordingly posted at Poona station from 30th September 1896 with two peons to work under him. He was instructed by the then Deputy Sanitary Commissioner Surgeon-Major Street as to how he should examine persons suspected to be suffering from plague, and directed to advise them to go to the Sassoon Hospital, and in the case of their refusing to do so to ascertain their destination and communicate it to the authorities concerned.

3. On 28th December the inspecting staff was increased to two medical men and four peons, who met all the passenger trains arriving from Bombay. On January 31st the inspecting staff was authorised to compel sufferers from the plague to go to the Plague Hospital. From February 20th the inspecting staff was required to watch persons leaving by rail as well as those arriving. From January 16th a cart was specially engaged for the conveyance of sick persons from the station to the hospital, and stretchers were provided to carry patients from the platform to the cart.

4. On March 15th a European Assistant Surgeon was deputed by Government for passenger inspection duty at Poona station. On March 21st the two municipal medical men were withdrawn and their duties taken up by four hospital assistants appointed by Government. On April 5th a second European Assistant Surgeon and three additional hospital assistants were detailed for duty. Thus the present strength of the inspecting staff at the Poona station is two Assistant Surgeons and seven hospital assistants appointed by Government and four peons supplied by the Poona Suburban Municipality.

5. At first the inspection chiefly consisted in watching third class passengers as they passed the ticket-collectors at the exits. Later on it was arranged with the railway authorities to require all third class passengers to pass into a compartment specially allotted in the third class waiting-room, where they were inspected by medical officers, while one medical man watched the exit for first and second class passengers.

6. Subsequently the work was carried out as follows :—

Half an hour before the departure of a train outgoing third class passengers were collected in the third class waiting-room and made to pass through in single file after being examined.

All persons suspected to be suffering from fever were detained, their temperatures were taken, and they were finally examined for plague in a small partitioned room. First and second class passengers were examined after they had taken their seats in their carriages. For the examination of arriving passengers two hospital assistants were placed at the exit door for third-class passengers, and an Assistant Surgeon at the exit for first and second class passengers. Each passenger was examined as he passed through. Those found to be suffering from plague were sent to the General Plague Hospital. Observation cases were sent to the Sassoon Hospital up to April 22nd and subsequently to the General Plague Hospital.

7. The Southern Maratha Railway Company posted one medical man at Poona station on 29th October 1896, and another on 22nd March 1897, to examine outgoing passengers by their line. These two medical men made their inspection on the overbridge leading to the Southern Maratha Railway platform.

8. The number of real and suspected plague cases reported to have been discovered by the inspecting staffs is given below :—

By Municipal medical men	...	...	481
By Government medical staff	...	...	155
By Southern Maratha Railway medical men			163

TOTAL			799
-------	--	--	-----

9. Details as to the number detected on each day are given in Appendices 48, 49, 50.

It may be noted that many of the cases reported to have been found are not traceable on any hospital register, and appear not to have been admitted to hospital. This applies particularly to the cases found by the Southern Maratha Railway medical men.

10. I may mention here that the officers of the various railway departments and the railway police have done all they can to facilitate the inspection of passengers. The inspection work has been controlled by Surgeon-Major Street, while Mr. Plunkett has taken a leading part in making the arrangements it entailed.

11. Under instructions from the Collector of Poona a medical man with two peons was posted at Kirkee railway station from 28th January 1897 to prevent persons affected with plague from alighting there and proceeding to Poona by road. On February 20th orders were given to watch outgoing as well as in-coming passengers. Seven suspected cases were discovered at Kirkee station. The staff was withdrawn on May 23rd.

12. It may be mentioned that by Government Resolution No. 1-B. of 4th March 1897, Government suspended the booking of third class passengers from Poona and neighbouring stations except in the case of persons who had obtained written permits from the District Magistrate of Poona or myself. The restriction was, however, withdrawn a few days later.

Inspection on Roads.

13. On 28th January a medical man was posted by the Collector at the Harris Bridge near Dapuri to inspect persons arriving by road and prevent any found to be suffering from plague from entering Poona. He was transferred to Poona City for other duty on March 13th. Three suspected cases of plague were discovered at this post.

14. After the work of the troops in the city commenced it was found that sufferers from the plague were removed from Poona by night in considerable numbers. Accordingly, on the night of the 29th March, cavalry picquets were placed on all the principal roads leading from the city to prevent the surreptitious removal of sick persons. On the 7th April native infantry picquets were stationed at Sowar's Gate and Lukdi Pul for the same purpose. These cavalry and infantry picquets were kept on till search operations by the military ceased. The picquets had orders to detain all sick persons found by them and to send them to the General Plague Hospital for examination. In the event of a corpse of a person being removed without a certificate of the registry of his death, they were required to detain one of the bearers in order that the necessary inquiries might be made.

15. The number of plague cases and corpses found by the picquets in the course of the operations amounted to 103 and 23 respectively. Particulars of the numbers found on each day are given in Appendix 51. The work of the picquets was of value both as checking the removal of the sick from Poona and as leading to the detection of plague cases.

XIII.—INOCULATION.

At an early stage of the operations it was thought desirable that the efficacy of inoculations against plague with Professor Haffkine's prophylactic lymph should be tested at Poona. A supply of lymph was accordingly obtained from Bombay, but it was found that none of the medical officers employed on plague duty had leisure to attend to the inoculations. The assistance of Surgeon-Colonel Edge, Principal Medical Officer, Poona District, was solicited in the matter, with the result that Surgeon-Lieutenant Dove, A.M.S., was sent to be trained in Professor Haffkine's laboratory and was subsequently sent down to Poona to carry on inoculation.

2. The work was commenced on March 25th under the personal direction of Professor Haffkine. From March 27th it was continued by Surgeon-Lieutenant Dove. Inoculations were carried on within Poona suburban limits at His Highness Aga Khan's Bungalow, which was kindly lent for the purpose, and at the Dinsha Maneckji Petit Dispensary in Poona Cantonment. It was not thought necessary to arrange for inoculations in the city as my inquiries led me to believe that few of the inhabitants would volunteer to be inoculated. Surgeon-Lieutenant Dove continued the inoculation work till May 13th, when, as a few people were coming forward to be inoculated, his services were replaced at the disposal of the Army Medical Department and the work was made over to the Civil Surgeon.

3. Appendix 52 shows the numbers and nationalities of the persons who were inoculated each week. In all, up to May 20th, 1,361 inoculations were carried out.

4. The officers in charge of the various plague hospitals were instructed to note whether any cases of plague occurred among persons who had been inoculated. No such cases have been reported, which is evidence in favour of the efficacy of Professor Haffkine's lymph. It has to be remembered, however, that the inoculations were not commenced till after the epidemic had passed its highest point, that a large proportion of the persons inoculated did not live in a highly infected locality, and that most of them did not belong to the classes that have been the chief sufferers from the plague in Poona.

XIV.—THE TROOPS EMPLOYED.

The troops employed on the operations against the plague were drawn from the following corps :—

Royal Artillery.	Bombay Sappers and Miners.
Royal Horse Artillery.	2nd Bombay Grenadiers.
Durham Light Infantry.	14th Bombay Infantry.
Royal Irish Rifles.	19th Bombay Infantry.
2nd Bombay Lancers.	28th Bombay Pioneers.

Men were also taken from the Commissariat and Transport Departments and the Army Medical Staff. The number of troops employed at different periods of the operations is shown in Appendix 53. It will be seen that the greatest number of troops was employed from March 20th to May 5th, when the total number of British and native troops on plague duty was 1,112. After May 5th, as the operations were contracted, the number of troops employed was gradually reduced till on June 1st it stood at 124.

2. The troops on plague duty were up to May 19th encamped at Parvati near the Sinhgad road with the exception of those who were

stationed as guards at the hospital and segregations camps and (from April 26th) those who did duty as watchmen at the burial and burning grounds. When the work of the military search, fumigation and limewashing parties ceased, the majority of the troops employed returned to military duty and the camp at Parvati was broken up. The native infantry who were retained for segregation and death registration work were moved to the General Segregation Camp, while the few men of the cavalry and the British regiments who remained on plague duty were allowed to live in their regimental lines.

3. Appendix 54 shows the chief alterations made from time to time in the constitution and strength of the search, fumigation and limewashing divisions, and gives other particulars regarding the employment of the troops. Appendices 55, 56 and 57 are tabular statements relating to guards on hospitals and camps, night picquets, and transport and ambulance respectively.

4. Disciplinary powers over the troops employed on the operations were vested in Major Paget, Commandant of the Plague Duty Camp. That officer's report, dated 20th May 1897, on the conduct and health of the troops is annexed (Appendix 58). The members of the Plague Committee concur with Major Paget in the high opinion he has expressed on the conduct of the troops, both Native and British. The discipline of the troops when at work in the city was excellent and the utmost consideration was shown both by officers and men for the religious and social customs of the inhabitants. I may mention that reports on the conduct of the men who worked under them were called for from the officers commanding the various working parties, and that the reports received were without exception favourable as regards both British and Native troops.

5. That the conduct of the men when engaged on plague work was so good is doubtless chiefly due to the fact that they were under the immediate command of British officers who were responsible for their discipline and good conduct just as they would have been if they had been employed on military duty. In the case of the search divisions, the supervision was particularly close. It was one of the principles of the search that the parties of a division should be kept together as much as possible, and the officer commanding the division was therefore seldom far away from any of the parties under him. In the case of the fumigation and limewashing divisions the supervision was not so close, as the exigencies of their work often compelled the parties of a division to work at a distance from each other. The limewashing and fumigation parties were, however, visited from time to time in the course of their morning's work by

the officer commanding them. A statement of the orders issued to the troops from time to time regarding their work and conduct will be found in Appendix 59.

6. During the first few days of the work of the troops in the city many applications, written and verbal, relative to the operations, were, as might be expected, made to myself and the other members of Plague Committee. Most of these related to inconveniences or losses alleged to have been caused to individuals by the work of the troops. Some of the inconveniences pointed out were inseparable from the operations which we were conducting, while others we were able to prevent the recurrence of by the issue of standing orders. When complaints of theft were made and the information necessary to trace the culprits was not given, the applicants were referred to the police. As our rules got to be understood by the people of Poona and our organization got more perfect, the number of applications diminished, and during the latter stages of the operations comparatively few complaints were received by us regarding the work of the troops. In order to check the making of false and frivolous complaints and at the same time to facilitate inquiries into complaints that might be well founded, we published a notification on March 26th (*vide* Appendix 4) to the effect that all complaints relating to the behaviour of the men employed on searching, fumigating and limewashing should be made on the spot to the officers commanding the divisions to which the men complained against belonged. The officers have been alive to the necessity of maintaining a high standard of conduct among their men, and it has never been alleged to the Committee that an officer has failed to inquire into a reasonable complaint which had been made to him.

7. The offences brought home to the troops engaged on plague duty are specified in Major Paget's report. The complaints made to the officers commanding search divisions, which were found to be false, included three of theft. Besides these a few minor complaints of such matters as entering god-rooms and cook-rooms unnecessarily were made to the officers, but where the men had offended the prejudices of the people in this way they appeared to have done so through ignorance. One unproved complaint of theft was made to the officer commanding a fumigation division and another to the officer commanding the main picquet. Some complaints of the needless destruction of property, as rubbish, were made against the limewashers to the officer commanding the division, but they were generally found by him to be untenable. The orders passed to prevent needless destruction of property have already been referred to. It was a matter of great satisfaction to the members of the

Plague Committee that no credible complaint that the modesty of a woman had been intentionally insulted was ever made either to themselves or to the officers under whom the troops worked.

8. The troops at the plague duty camp were under the medical charge of Surgeon-Lieutenant Kiddle. The men were paraded daily before they left the camp for plague duty, and men found not to be in thoroughly good health were not allowed by the medical officer to proceed. The health of the troops is reported by Surgeon-Lieutenant Kiddle to have been excellent, a result which is no doubt due to regular hours, good feeding and the careful supervision which he exercised. Not a single case of plague occurred among the troops employed. The total number of admissions to hospital from March 12th to May 19th was among British troops 70 and among Native troops 19. The majority of the admissions were due to minor ailments, and only 19 cases (12 among British and 7 among Natives) were of sufficient importance to call for the transfer of the patients from camp to a regular hospital. The only case that ended fatally was one of heat-apoplexy. The victim was a man of the Royal Irish Rifles who is believed to have contracted his illness through his own imprudence.

9. I have much pleasure in acknowledging on behalf of my colleagues on the Plague Committee as well as on my own account the valuable assistance which we have received throughout the operations from Major Paget. His unfailing tact and courtesy have contributed in no small degree to the success of our measures. In the opinion that he has recorded regarding the officers and men engaged on the operations we fully concur. In addition to the good work that he has acknowledged we desire to place on record our appreciation of the work done by Lieutenant Mackenzie and subsequently by Lieutenant Owen Lewis in connection with death registration and the supervision of burial and burning grounds. We consider that the work that has been carried out by Major Paget and the officers and troops under him has been most successfully performed, and that it is chiefly due to their exertions that the plague in Poona has been practically stamped out.

XV.—FINANCIAL.

The time has not arrived for making up complete accounts of the expenditure on the plague operations at Poona. I will therefore confine myself to showing the allotments which were made by Government up to the 31st of May to meet the cost of the operations, and the disbursements which were made therefrom up to that date.

2. The following statement shows the allotments that have been made to myself and the Poona Plague Committee :—

Number and date of Government Resolution sanctioning allotment.						Amount.
						Rs.
¹²¹⁶ 716-P.	of 6th March 1897	...	...	...	...	10,000
¹⁷⁸² 1242-P.	of 1st April 1897	...	...	...	...	26,000
¹⁰⁰³ 1319-P.	of 7th April 1897	...	...	...	...	60,000
²⁵³⁶ 1056-P.	of 10th May 1897	...	...	...	...	40,000
TOTAL						1,30,000

3. The disbursements made from the abovementioned allotments up to 31st May 1897 are shown below :—

Item.				#	Amount.		
					Rs.	A.	P.
<i>Advances—</i>							
To Camp Commandant for pay of troops, etc....					56,999	11	4
To Chairman, Suburban Municipality, for main- tenance of General Plague Hospital, etc. ...					22,000	0	0
To City Police Inspector ...					100	0	0
To Medical Officers ...					185	0	0
To Secretary, City Municipality ...					50	11	0
TOTAL				...	79,335	6	4
<i>Establishments (including day labourers)—</i>							
Conservancy ...				...	14,321	2	8
Sanitary ...				...	993	8	4
Nurses ...				...	564	10	10
Medical Officer on inoculation duty				...	425	12	11
Inoculation (subordinate establishment)				...	46	7	8
Plague office ...				...	49	13	2
Female searchers ...				...	952	10	11
Warehouse ...				...	32	8	3
Burial-grounds ...				...	265	5	4
Corporal sent to Bombay				...	21	4	0
Plague Police ...				...	153	7	8
Store-house and work-shop				...	659	13	8
Bombay Inspector lent for duty at Poona				...	118	4	0
TOTAL				...	18,704	13	5

Item.			Amount.		
			Rs.	A.	P.
General Segregation Camp (construction)	...	...	6,814	0	0
" " (maintenance)	...	...	3465	11	5
Railway charges	...	...	292	8	3
Cooly hire	...	...	8	10	3
Cart hire	...	...	1,090	10	0
Conveyance hire	...	...	1,321	0	0
General Plague Hospital (construction)	...	...	7,000	0	0
Mahomedan do. (grant-in-aid)	...	...	1,000	0	0
Water-supply charges	...	...	458	11	11
Burial charges	...	...	308	8	9
Compensation	...	...	1,333	9	0
Disinfectants	...	...	2,518	10	0
Telegraph charges	...	...	676	1	0
Printing charges	...	...	142	2	0
Service stamps	...	...	60	0	0
Maps and stationery	...	...	53	7	0
Deadstock and furniture	...	...	986	7	8
Oil	...	...	99	5	1
Warehouse rent	...	...	7	10	3
Conservancy expenses	...	...	1,402	14	4
Inoculation expenses	...	...	53	3	0
TOTAL			1,27,133	5	8

XVI.—CONCLUSION.

Paragraphs 1 to 3 missing.

4. In conclusion I would record my opinion that if a reasonably high standard of sanitation is to be maintained in the city of Poona, and the work that has been done there under Surgeon-Major Barry's supervision is to have lasting results, European control will for some time to come be absolutely necessary. The exact shape that control should take is a matter of detail, but I am convinced of the futility of expecting that the sanitation of the city will be better in the near future than it has been in the past, unless it is under the direction of a supervising authority that possesses practical knowledge and appreciation of European standards of cleanliness.

Report on Sind by Mr. Wingate, Acting Commissioner.**No. 2.****First protective measures.**

On the 3rd October 1896 the Karachi Chamber of Commerce addressed the Commissioner in Sind through their Chairman, the Honourable Mr. McLellan, suggesting that precautionary measures against the introduction of plague from Bombay should be taken, such as subjecting the passengers of vessels arriving to a medical examination. The imposition of quarantine was not recommended. Next day a letter was received by the Commissioner in Sind from the Principal Medical Officer, Sind District, inquiring as to the state of the law in respect to dealing with vessels and passengers infected with plague. The Honourable Mr. James on the 5th idem communicated with Government by telegram, and under Notification, dated 13th October 1896, No. 4530, Government published rules for quarantine against plague in the port of Karachi. Under these rules, no communication with the shore was permitted till the Health Officer of the Port had ascertained by inquiry from the Commander whether any person on board had suffered from plague. If there had been no plague, pratique was granted. If there had been plague, the passengers and crew were to be removed to the quarantine station for a period varying from 8 to 15 days.

Sea quarantine.**Quarantine arrangements.**

The Commissioner in Sind immediately took steps, in consultation with the Principal Medical Officer, Sind District, and the officers of the port, to increase the accommodation at the quarantine station at Manora and to provide extra police for enforcing the restrictions imposed. To consider these questions, a meeting of officers assembled at Government House on the 16th October under the presidency of the Honourable Mr. James, and it was arranged to fit up the hulk *Manora* for Europeans and to erect sheds for 300 native passengers in addition to the accommodation for 100 already existing, the expenditure to be divided between Government, the Port Trust, and the Municipality. The two latter bodies subsequently intimated their consent to contribute one-third share each. The operations were entrusted to Mr. Jackson, the Officiating Port Engineer, and, with commendable despatch, he reported on the 24th October that everything was ready for occupation.

These proceedings were reported to Government, and by Government Resolution No. 5202, dated 26th November 1896, General Department, Government sanctioned the estimated expenditure for

Rs.	temporary quarantine accommodation
-----	------------------------------------

* Spent by the Port Engineer 6,517	and also the expenditure for establishment and other expenses to be incurred by the Principal Medical Officer, the cost* to be divided as
Spent by the Health Officer 5,136	

proposed. Government approved the entertainment of the additional police, the exact strength and cost being finally sanctioned by Government Resolution No. 1672, dated 2nd March, 1897, Judicial Department. The Port Trust placed a steam-launch at the disposal of the District Superintendent of Police.

The rules required that healthy ships to secure pratique must carry a medical man. One or two coasting steamers neglected this rule, and on board other steamers death from plague had occurred. Thus a considerable number, between 600 and 700 persons at a time, were detained in quarantine, necessitating increased accommodation. The Collector of Karachi, at the instance of the Honourable Mr. James, early in December, made arrangements for the supply by private charity of food to those persons in quarantine who were indigent. The administration of the quarantine rules and arrangements was supervised by the Principal Medical Officer, Sind District. Ships in quarantine.

On the 16th December, while on tour, the Acting Commissioner in Sind received intimation from the Health Officer through the Collector of Karachi of what was reported to be a "doubtful" case of plague. A Brahman cook, aged 16 years, resident for 9 months in Karachi, stated to have taken ill about the 4th December, was reported on the 8th to the Health Officer to be suffering from bubonic fever. There was high temperature and a bubo. The same evening the patient was removed from Rampart Road, Bandar Quarter, to a house in Maoji Street, Ranchor Quarter, where next morning he died. Thus early began that removal from place to place which to the last was difficult to deal with. First case.

The Acting Commissioner directed definite medical inquiry, but on the 18th he received the Health Officer's report, dated the 12th, which left no doubt that the disease had broken out in Karachi, and the facts narrated below were reported to Government. Disease breaks out in Karachi.

An old servant of the firm of Radhakishn Tejbandas & Co. died on the 11th December after, it was said, a 12 days' illness. Another servant of the firm, aged 28, also living in the old town quarter, was seen by the Health Officer on the 11th and found to have a temperature of 103° and swellings in both groins. In a house close by, in which four persons had died in the course of a few days, including a child seen by the Health Officer on the 11th, another child, aged 5 years, was found sick. On the morning of the 12th the Health Officer took the Deputy Sanitary Commissioner, Sind Registration District, to view the cases.

On the 19th December, at their usual weekly meeting, the Medical Board declared plague epidemic in Karachi. Their report Plague declared epidemic in Karachi.

reached the Acting Commissioner on the 22nd, and was the same day communicated to Government by telegram, and the Principal Medical Officer was asked for daily reports of attacks and deaths.

These facts leave little doubt that, from the beginning of December 1896, the disease had got a footing in Karachi. There was nothing in the mortality statistics to indicate the presence of the disease.

Mortality statistics.

Week ending	DEATH FROM ALL CAUSES.		AVERAGE DEATHS OF 5 YEARS ENDING 1895.	
	Total.	Daily average.	Total.	Daily average.
6th October 1896	83	12	65	9
13th "	51	7	56	8
20th "	61	9	58	8
27th "	59	8	58	8
3rd November	54	8	62	9
10th "	59	8	65	9
17th "	72	10	69	10
24th "	74	11	67	10
1st December	80	11	70	10
8th "	85	12	81	12
15th "	86	12	82	12
22nd "	104	15	102	15

Undetected cases.

Alterations of quarantine rules.

The usual deaths amongst cases classed "imported" are wanting in the history of the introduction of plague into Karachi. Since October there had been numerous arrivals from Bombay in Karachi. The Health Officer states that there was medical examination of passengers on board healthy vessels, but there was nothing to prevent persons slightly affected with the disease walking ashore. The quarantine rules had failed to protect Karachi, and it was useless to maintain them. The question was mooted by the Principal Medical Officer in his letter to the Commissioner in Sind, dated 4th January 1897, and was brought to the notice of the Government of India a little later by Messrs. Mackinnon, Mackenzie & Co.

The municipality were in favour of more stringency, by imposing ten days' detention on all arrivals, and the Principal Medical Officer and the majority of the Managing Committee of the Chamber of Commerce were in favour of maintaining the existing rules. After carefully considering these questions, the Acting Commissioner informed Government that the disease was thoroughly established locally, and that there was no evidence of any imported cases occurring, and therefore the imposition of a more rigid quarantine was uncalled for. In his opinion, a searching medical examination of passengers departing from Bombay, and an equally rigorous scrutiny at Karachi, should be substituted for the present rules. It was singular that, notwithstanding the detention of between 1,500 and 1,600 persons arriving at Manora, not a single case of plague had been detected. Government approved these suggestions, and by Notification No. 592, dated 3rd February, 1897, the rules of 13th October, 1896, were amended so as to introduce compulsory individual medical inspection, and the compulsory isolation of any sick discovered, and the segregation of persons in immediate contact with the sick or with any one who had died, and suspicion was made sufficient authority for action.

The Port Officer, Commander Shopland, had questioned whether much faith could be placed on the class of medical officers that could be procured for a temporary job on board a steamer for Rs. 100 per mensem, and he had little doubt that plague had been introduced through allowing vessels to land passengers freely when no case of sickness was reported. The voyage from Bombay need not take longer than 36 hours.

Up to the end of December 1896, 63 cases of plague, all local, reported in Karachi. Fifty-one of these cases occurred in the old town. The deaths reported were as under:—

During week ending 10th December	...	...	...	1
" " 17th "	...	...	...	9
" " 24th "	...	...	...	21
" " 31st "	...	...	...	28

Course of epidemic up to end of December.

or a total of 59. In a telegram received on 1st January 1897, Government directed that arrangements should be made for medical inspection of passengers at Karachi and the principal railway stations in Sind. The Principal Medical Officer was requested to arrange for efficient inspection, and on the same date, the 1st, all district officers were required to adopt, in consultation with the medical and railway officers, such measures as might be possible to prevent infection spreading.

Inspection of passengers by rail.

On the same date, the Collector of Karachi was asked to return from his tour to Karachi, to supervise measures necessary to prevent

infected persons leaving and the disease spreading, whether within or without Karachi, and Mr. Giles most promptly responded and remained at headquarters throughout the epidemic.

Municipal work.

Meanwhile, the Municipality of Karachi had not been idle. It appears that early in October, 1896, the Health Officer, Dr. Kaka, called attention to the necessity for special sanitary vigilance, and on the 16th December following he addressed a letter to the President of the Municipality, representing that he had already experienced opposition, and the residents of houses where cases had occurred had flatly refused to permit disinfection of the rooms occupied by the sick.

Dr. Kaka's suggestions.

Dr. Kaka, therefore, strongly urged the necessity for increased powers, advocating (1) compulsory notification of sickness by the inmates of the house and by the medical attendant, (2) compulsory segregation of the sick in specially provided hospitals for each community, (3) compulsory disinfection and limewashing, (4) destruction of infected articles, as clothing, bedding, etc. Next day, a conference was held at the house of Rao Bahadur Alumal Trikamdas, B.A., Deputy Educational Inspector, where several of the headmen of the Hindu sects were present, and at which the President, Engineer and Secretary, and the Health Officer of the Municipality attended. Here Dr. Kaka's proposals underwent considerable alteration. Dr. Kaka said he would not object to allow patients to be segregated in their own houses,

Conference.

Segregation.

"but in the case of the very poor and in the case of tenement houses where more than one family resided," it would be absolutely necessary to remove the patients to isolation hospitals. On the 21st and 23rd December the Corporation passed resolutions omitting compulsory notification of sickness by residents and limiting compulsory removal to hospital of cases where, in the opinion of the Health Officer or of any duly qualified medical practitioner, the sick person was without proper segregation accommodation. Where the Health Officer or any such medical practitioner certified there was proper segregation, the patient was to remain in the house.

Detection of cases and segregation.

The Deputy Sanitary Commissioner, Surgeon-Captain Arnim, who had been active in visiting cases, on the 19th December reported the existence of plague in Karachi to the Sanitary Commissioner with the Government of Bombay, and also wrote to the Municipality, suggesting that every effort should be made to procure information of sickness, and that, "where possible and in cases where accommodation is unsatisfactory, attempts should be made to isolate the patient." The Sanitary Commissioner, Surgeon-Lieutenant-Colonel Clarkson, writing on 25th December, strongly advocated compulsory isolation of the sick. The attention of Surgeon-Captain Arnim and of the Karachi

Municipality was, on 31st idem, called to this letter, and the immense value of isolation, and a copy of it was also despatched to all district officers. It was requested that daily reports might be submitted for any place where plague might unfortunately appear, and "isolation should be everywhere promptly enforced."

On the 1st January, 1897, the Acting Commissioner received a copy of a letter addressed by the Deputy Sanitary Commissioner to the Sanitary Commissioner, Bombay, giving a full account of the state of affairs up to December 30th. As far as local conditions ^{Cleaning and disinfecting.} allowed, cleaning and disinfection were being efficiently and energetically carried out by the municipal executive. Suitable houses in the town had been set apart as caste hospitals, ^{Caste hospitals.} which would provide for patients who did not possess spacious and well ventilated private dwellings of their own. Surgeon-Captain Arnim added—

"There is a marked opposition among the Municipal Com- ^{Opposition.} missioners and the inhabitants of the town to the complete isolation which the removal of the sick to the Lyari isolation sheds would necessitate; indeed, there is reason to believe that, at present at least, the feeling among the townspeople would not admit of the segregation of all cases at the Lyari sheds."

All were working with energy and system. His inquiries had failed to trace the disease to any source outside Karachi. The Deputy Sanitary Commissioner thought that, most probably, the disease had been prevalent in the town previous to the date upon which attention was drawn to the first two cases.

On the 1st January, a copy of the Deputy Sanitary Commissioner's ^{Notice of plague cases.} letter was sent to the Collector of Karachi, stating that, with a trifling exception, the Acting Commissioner saw nothing to object to in the Municipal resolutions, but it should be incumbent on householders to give notice of plague cases.

In giving sanction to the Municipal resolutions, the Acting Com- ^{Visit of the Acting Commissioner.} missioner judged it advisable to proceed immediately to Karachi to ascertain how far the Municipality were in a position to carry them into effect, and particularly in what attitude the Municipality stood towards the Muhammadan population. He arrived in Karachi early on the morning of the 3rd January, and at once called upon the Principal Medical Officer, and Surgeon-Colonel Bainbridge kindly consented to accompany the Acting Commissioner on a tour of inspection through the native city. Mr. Giles, the Collector of Karachi, Surgeon-Lieutenant-Colonel Henderson, the Civil Surgeon, Surgeon-Captain Arnim, the Deputy Sanitary Commissioner, Dr. Kaka, the Health

Disinfection.

Officer, and others were of the party. It was gratifying to observe that Surgeon-Captain Arnim's description of Municipal energy was even less than the facts warranted. The disinfection of rooms in which deaths occurred was most thorough, and to Dr. Kaka is due the very high credit of the free use of perchloride of mercury as a disinfecting agent from the commencement of operations. In those early days, the saturation of houses and the watering of streets was excessive, but that was almost immediately remedied and one of the popular complaints of that morning was removed.

Caste hospitals empty.

The buildings called caste hospitals were empty. It was clear to every one that they could only be filled up by compulsion. A meeting was convened at Government House on the afternoon of the 4th, at which the Collector, the medical officers named and the municipal executive, including Mr. Tabilram, the President, and Mr. Strachan, the Engineer and Secretary, were present. The Acting Commissioner had consulted these officers. The Collector considered that section 73 of the District Municipal Act was inadequate to deal with the disease and there was no provision of law to render compulsory notification of plague legal. The Honourable Mr. James, in a letter of 30th November, 1896, had expressed a similar opinion that, under section 73, compulsory segregation of the sick would be unauthorised.

Legal.

The Principal Medical Officer, the Collector of Karachi and the President of the Municipality, as also Mr. Strachan and Dr. Kaka were of opinion that no segregation of sick was possible without compulsion, and that in the present state of the public mind compulsion would not be the best way of meeting the epidemic. In fact, it would be the worst possible means to adopt. As a scientific method, the Civil Surgeon and the Deputy Sanitary Commissioner advocated segregation but considered compulsion necessary, and that it would be met by opposition.

Compulsory segregation of the sick considered inadvisable.

Difficulties.

The Acting Commissioner reviewed the position with great care, chiefly in view of the fact that there were, according to the last census, over 51,000 Muhammadans to some 42,000 Hindus, that the former had probably still further increased the disparity of numbers in the interval, and that it was practically a Hindu Municipality who would have the task of enforcing rules in the teeth of the Muhammadan majority, a majority composed largely of a fanatical congeries of tribes and nations, not one of whom had listened to the proposal for caste hospitals, nor was there a Muhammadan hospital in existence. Asked how the Municipality proposed to carry out their rules, the reply was "The Police." And the Acting Commissioner silently resolved that, if the Municipality were to pass rules hateful to both Hindu and Muhammadan, at once retire to the back ground, and leave

the police to fight with the people he would prefer the rules should be his own, the personality his own, and before attempting to drive a crowd of terrified and panic-stricken people, he would be quite sure he could treat the sick when they were segregated. He had seen the effect in cholera and famine of crowding numbers without carefully prepared arrangement, and determined to meet Hindu with Hindu and Muhammadan with Muhammadan, and, if possible, to win the confidence of both before resorting to compulsion.

On the 4th January, immediately after the meeting, the Collector was informed that the Acting Commissioner was unable to sanction the compulsory removal clause as it stood. The clause, read with the directions, left a door of escape for the rich and none for the poor, and these would ignorantly and fanatically resist compulsion. Government were informed that the fear of this impending compulsory seizure of the sick had already produced something like panic: medical aid was being rejected, sickness was concealed, and the population hostile. Surgeon-Colonel Bainbridge had concurred that it would be inadvisable to resort to compulsion. The segregation must be effectual, or it must be abandoned as impracticable. The Municipal President and the Engineer and Secretary had warned that a reign of terror would certainly follow resort to force, and better results were to be expected from conciliation. It came to this—either sick people must be dragged from their homes by force and opposition be met by force, or else this terror of compulsory removal must be allayed and sympathy and conciliation take its place. The success of segregation depended upon the population being more or less consenting, not opposed, to the remedy. The Muhammadans, for example, would not even set a house apart. A Muhammadan medical officer would greatly strengthen the Municipality, and an effort would be made to render the hospitals, if possible, popular.

Abandonment of compulsory segregation.

A valuable suggestion from Surgeon-Lieutenant-Colonel Clarkson was placed before the meeting, and accepted by the Municipality, that the town should be divided into districts and a medical officer be appointed to each, to see every case of suspected plague before removal, and an Inspector, whose duty it would be to find out the cases. The Municipality immediately appointed Inspectors, and these men proved most useful in securing correct and early information.

District Inspectors.

The Collector writes in paragraph 24 of his report that he is still firmly convinced that the policy adopted at the time was the right policy, that, to a very considerable extent, it had the immediate effect aimed at; the people readily opened their houses to visitation and disinfection, while the same conciliatory

Success of the system of treating the people.

policy continued led the people, who had unanimously rejected both treatment and segregation, to accept both.

The Acting Commissioner returned to his camp, 'confident in leaving the Collector at the head of affairs, and hopeful that, now a breathing space had been obtained to exhibit the real sympathy felt by Government towards the suffering, the measures taken at Karachi would not be the signal for terror and panic, should plague spread in Sind, but would make it practicable to adopt greater stringency in other places.

The Collector had one or two meetings with the Muhammadans, and promised them a lady doctor and Muhammadan doctors. Miss Duggan, a fully qualified doctor, was appointed by the Municipality on the 8th January for pardah ladies. The Muhammadans generally acquiesced in the measures sanctioned, but when the disease crossed the Lyari into their quarter, as it did on January 10th, opposition was shown on the 18th, when the Health Officer wished to disinfect a house and to burn down a hut. The Collector went in person, acted with firmness and tact, sentenced the chief offenders, and enforced compliance. This was the only instance in Sind of obstinate resistance to authority, and it proceeded from the fisher class, who on previous occasions of epidemics had been difficult to manage.

Lady Doctor.

Trans-Lyari
Muhammadan
opposition.

From the 1st January the disease suddenly increased. On the 1st, the number of cases rose to 10, on the 7th to 20, and on the 14th to 34. On the recommendation of the Collector, the District Superintendent of Police abandoned his tour and devoted himself to organising the police arrangements. The infected quarter was being deserted. Most fled by rail and ship; many to houses of friends, or to houses rented in other parts of Karachi. To intercept the local migration, the Collector, with the aid of the General Officer Commanding, established a police and military cordon between the city on one side and the Sadar Bazar and the Cantonments on the other. This cordon was valuable in checking the general influx that would have taken place. The formation of health camps was the subject of much demi-official correspondence. Mr. Strachan, the Engineer and Secretary, lent himself with his usual energy and capacity to the erection of huts on a site across the Lyari, but remote from the Muhammadan settlements, while Mr. Tahilram, the President, and the Collector were persistent in their efforts to persuade the Nasarpuris, a sect of well-to-do Hindus, occupying good houses in the Old Town, to move into the camp. For these people to live in mat huts was a degradation

Flight.

Establishment of
cordon.

Evacuation and
health camps.

from which they shrank. Eventually, they agreed to move, but only on their own conditions. These were wisely agreed to. To get the Old Town quarter completely evacuated and set an example that would silence prejudice were the objects in view. At this stage, compulsion would have scattered the population like sheep, and distrust of the authorities would have been spread through the land.

The increasing daily death-rate caused the Acting Commissioner to hurry through some necessary business, and he relinquished the rest of his tour on the 23rd January. He arrived in Karachi to find the first health camp just occupied by some 2,000 Nasarpuris. The camp did Mr. Strachan very great credit. It was well laid out, with water-pipes and bathing platforms; in fact the Municipality had spared no expense to make the camp attractive and convince the people that the desire was to save, not to kill. As an instance of the feeling at the time, a few days later, a party would not enter ready-made huts, saying the huts might be poisoned, but they accepted new materials and made their own huts. It was not then known that plague affects the heart, and the sudden deaths of people, not apparently very severely ill, gave ignorant imagination its opportunity. On the 26th January Surgeon-General Cleghorn, C.S.I., the Sanitary Commissioner with the Government of India, arrived to examine the measures taken. He was unfortunately obliged to leave next evening, recalled to attend the Venice Convention; but his visit was most beneficial in encouraging the efforts that were being made to get people out of infected houses. The following suggestions were made by Dr. Cleghorn:—

- (a) That Dr. Arnim should be placed in charge of the different camps, in which the population would require careful supervision. Dr. Cleghorn's suggestions.
- (b) That a house evacuated should not be re-occupied until its interior had been thoroughly cleansed, disinfected and whitewashed, and that these measures should be extended as widely as possible.
- (c) That permission to re-occupy a place not fit for habitation should be refused.
- (d) That overcrowding should be prevented.
- (e) That a commissioned medical officer should inspect railway passenger traffic from Karachi.

The sequel proved that the first suggestion would have established the success of the Nasarpuri Health Camp experiment.

Other camps, however, have conclusively 'proved what immediate results follow a camp managed as Dr. Cleghorn suggested under medical supervision. The disease was attacking new quarters, and it required the whole strength of the officers available, and Dr. Arnim was soon engaged with many others in a hand-to-hand struggle with the pestilence at its worst.

On the 1st, 2nd and 3rd February there was a sudden accession of plague cases.

From the 28th January the daily figures had been rising, but on these three days, the number rose to 59, 49 and 56, respectively,—a record never subsequently reached. In fact the epidemic in the first week in February attained its climax, and thereafter, though the outbreaks in new quarters partially obscured the fact, the disease gradually abated, as the marginally noted figures, taken from Dr. Kaka's reports, show. Or, taken by months, the mortality was as follows, recollecting that February is the shortest month:—

		Total plague deaths.
Climax of the disease. c	Week ending 10th December 1896 ...	1
	" 17th " " ...	9
	" 24th " " ...	21
	" 31st " " ...	28
	" 7th January 1897 ...	103
	" 14th " " ...	159
	" 21st " " ...	200
	" 28th " " ...	181
	" 4th February 1897 ...	295
	" 11th " " ...	262
Decline.	" 18th " " ...	239
	" 25th " " ...	217
	" 4th March 1897 ...	197
	" 11th " " ...	207
	" 18th " " ...	189
	" 25th " " ...	188
	" 1st April 1897 ...	192
	" 8th " " ...	172
	" 15th " " ...	115
	" 22nd " " ...	127
	" 29th " " ...	86
	" 26th May 1897 ...	65
	" 13th " " ...	52
	" 20th " " ...	23
	" 27th " " ...	20
	" 3rd June 1897 ...	29
	" 10th " " ...	7
	" 17th " " ...	1
	" 24th " " ...	2

Monthly Statistics.

In December 1896 ...	...	59 deaths from plague.
In January 1897 ...	...	743 " "
In February " ...	...	995 " "
In March " ...	...	864 " "
In April " ...	...	538 " "
In May " ...	...	167 " "
In June " ...	...	23 " "
In July " ...	...	9 " "

Exodus.

The movements of the population corresponded with these figures. The exodus by road, and specially to encampments or villages in the neighbourhood, was considerable, but figures are not available. The numbers entering and leaving Karachi by rail and

sea are known, and the net difference between arrivals and departures is as follows :—

Population of 1891.			Net difference between arrivals and departures.	Remaining population.
In December 1896—98, 195	...	...	—3,223	94,972
In January 1897	"	...	—11,047	83,925
In February "	"	...	—9,461	74,464
In March "	"	...	—4,232	70,232
In April "	"	...	+1,951	72,183
In May "	"	...	+5,733	77,916
In June "	"	...	+4,405	82,321

leaving a net loss at the end of June of nearly 16,000 people. The full table is given in the Appendix B. As already stated, the figures for 1891 are much below the true population.

In his final suggestion Surgeon-General Cleghorn called attention to the necessity of more effectual control over this exodus. As early as the first week in January, a few days after his return to Karachi, Mr. Giles addressed the Principal Medical Officer, pointing out that the arrangements at the Karachi departure platforms were not stringent enough. On the 8th, the Acting Commissioner wrote that the Government of India seemed very anxious that it should be made impossible for any one ill with bubonic fever to get away from Karachi. With this object, 4 European Travelling Inspectors, engaged by the Collector to travel as far as Dadu station with each train, had been sanctioned, and suggestions for strengthening the medical inspection were invited from the Principal Medical Officer. On the same date, the 8th, a letter was received from the Deputy Sanitary Commissioner, Sind Registration District, forwarding copy of a letter addressed to district officers, based on instructions received from the Sanitary Commissioner, Bombay, as to the necessity of watching the arrival of trains at stations and intercepting any sick persons. On the 4th, Government had inquired by wire what arrangements were proposed, on the 6th the Manager, North-Western Railway, telegraphed that the Punjab Government had taken precautions at Khanpur, Shershah and Raewind. From a letter received from the same source on the 9th, it appeared that the Manager, by request of the Director-General of Railways, had on the 31st December, 1896, wired to the Principal Medical Officer to order inspection

Railway inspection and watch in municipalities.

of passengers at principal stations in conjunction with the civil authorities. Accordingly, on the 10th, the Acting Commissioner issued detailed directions to all district officers in continuation of previous correspondence, informing them that the Principal Medical Officer had in consultation with the North-Western Railway issued instructions to the Civil Surgeons and Hospital Assistants for medical inspection of travellers at Karachi and all principal railway stations in Sind. These arrangements required to be supplemented by watchfulness on the part of Revenue and Police officers. Each district officer should make himself acquainted with the arrangements made for his district, and, if in any way defective, he should at once take necessary action. Any remissness or inability on the part of the hospital assistants to inspect or attend the arrival of trains should be promptly brought to notice of the officer to whom they were subordinate. The object now was, if possible, to prevent the disease spreading. All municipalities should be called on to take steps for their protection, and any suspicious case entering a town should be promptly reported to the medical officer. Attention was invited to the railway rules dealing with infectious cases, and it was pointed out that the sick man's relations or friends travelling with him should also be kept under observation. Great care would have to be exercised that sick did not alight at wayside stations with the intention of avoiding medical inspection and getting to their destination by road. The Railway Police and officials were asked to assist in preventing this. At main stations, two sheds should be provided, one for sick and one for relatives. Communication with the town should be prevented, and everything done for making the *detenus* as comfortable for the days of their enforced residence as circumstances would permit. For this end each hospital assistant should be allowed a small permanent advance from Municipal or Local funds. Magisterial and Police officers should be responsible for enforcement of segregation. The Principal Medical Officer had been asked to arrange for examination by an experienced medical officer of persons detained on suspicion. The utmost consideration should be shown to all sufferers, and persons should not be forcibly examined for glandular swellings, but if suspicious detained. Females should in no case be subjected to any bodily examination, and the strictest attention should be paid to their customs and prejudices.

In forwarding a copy of the circular to Government, the Acting Commissioner observed that these measures appeared the least stringent that could be of any use to check spread of infection, and, if the law did not justify them, he hoped steps might be taken to

legalise the action taken. Government approved the measures, and this was communicated to all officers on the 6th February.

On the 23rd January, the Acting Commissioner was able to reply to Government that the inspection of all passengers before leaving the Karachi city and cantonment stations and at one or two places *en route*, specially at Dadu and Sukkur, was careful and thorough. A European Inspector travelled as far as Dadu. At every station passengers alighting were examined by a medical officer and at all principal stations isolation sheds were ready. Nearly every Municipality had provided itself with rules under section 73 of the District Municipal Act, and all had been active in cleaning up. Segregation was to be insisted upon up-country. The immediate evacuation of an infected house and the camping out of the inmates, and similar evacuation by the entire community of an infected quarter, coupled with systematic house-cleaning and whitewashing and burning of all rags and rubbish under European supervision were means likely to prove effectual. A copy of this report was forwarded to all District Officers and the Principal Medical Officer.

The Manager, North-Western Railway, had suggested Dadu and Ruk stations for the principal medical examination of trains. Ruk was impracticable, as no adequate supervision could be exercised. At Dadu the trains arrived by day light. The Principal Medical Officer was, on the 10th January, asked to arrange for medical inspection of all passengers in the train on arrival at Dadu in the manner suggested by the Manager, and enquiry was made whether careful medical inspection of persons leaving Hyderabad railway station by the new Rohri-Kotri line had been arranged, as it seemed probable that persons would utilise that route to evade Dadu. The Acting Commissioner further suggested the desirability of placing a Commissioned Medical officer on special duty to supervise medical inspections at the Karachi stations, and on the railway generally. The Principal Medical Officer replied that, on the 12th January, he had telegraphed to the Surgeon-General, Bombay, for a Commissioned officer. On the 26th January, a very full report was received from the Principal Medical Officer, detailing the arrangements he had made. Surgeon-Lieutenant-Colonel Henderson, the Civil Surgeon, Karachi, reported that, from the evening of the 13th December, 1896, inspections were being held at Karachi. There was inspection of all passengers leaving Karachi by both up-mails, first at the city station by a Hospital Assistant and afterwards at the cantonment station by the Railway Apothecary. The Civil Surgeon had on several occasions been present, and the Principal Medical

Principal
Inspection
Stations.

Officer had paid a few visits. Since December inspections had been ordered at—

Kotri from the 2nd January.	Jacobabad from December 26th.
Laki " "	Shikarpur " " 22nd.
Dadu " "	Sukkur " " 30th.
Hyderabad " "	Rohri " January 2nd.
Pad Edan " "	Reti " " " "
Ruk " "	

The chief inspections were made by day-light at Kotri, Dadu, Sukkur and Jacobabad ; at other places the examinations were subsidiary. Since the 14th January, down-trains were also being examined. Medical subordinates in charge of dispensaries were also examining at—

Schwan.	Mirpur Khas.
Tando Adam.	Ghotki.
Tando Alahyar.	Larkana.

At Jungshahi, the station for Tatta, a special Hospital Assistant had been posted from the 7th January. Isolation and segregation sheds had been constructed by the Municipal and District authorities and in some instances by the Railway.

Karachi to
Cutch.

On the 27th January, the Political Agent, Cutch, was informed by telegram that the Cutchi quarter of Karachi was affected, and Cutchis were leaving Karachi by steamer, and it was advisable to take precautions.

Inspections by
Commissioned
Medical officers.

The weak spot in these arrangements was, however, the need for a Commissioned Medical officer, and this Surgeon-General Cleghorn pointed out. This want was supplied on receipt of Government telegram dated 6th February. The Principal Medical Officer was requested to arrange for platform inspections by commissioned medical officers. The Principal Medical Officer immediately directed the Civil Surgeons at Karachi, Sukkur and Hyderabad, and at Shikarpur the Assistant Surgeon, to conduct the examination personally. A second examination at Dadu by a Commissioned officer was, however, urged, as both trains arrived by day-light and the extra 10 hours gave the fever time to develop. On the 8th the Principal Medical Officer telegraphed for two officers. By the 15th February Surgeon-Lieutenant A. Gwyther was posted at Dadu, where was a bungalow and a refreshment-room and a segregation camp, and Surgeon-Lieutenant M. R. J. Rainier was posted to Karachi City and Cantonment stations. Detailed rules for their guidance were drawn up and issued by the Acting Commissioner, in consultation with the Principal Medical Officer, on the 20th February, and were approved

by Government Resolution No. 1093-563-P., dated 27th February 1897, General Department. These two officers performed their tedious duty most conscientiously. From the middle of February, therefore, it became very difficult for any sick persons travelling by rail to escape detention, and many passengers were so detained.

Surgeon-General Cleghorn's recommendation as to the thorough disinfection of houses had been, as already stated, anticipated to a certain extent by Dr. Kaka, but a visit to the city on the 25th January of the Acting Commissioner, accompanied by the Principal Medical Officer, the Civil Surgeon, the Deputy Sanitary Commissioner, the Municipal authorities and the Collector of Karachi, followed by another inspection on the 27th with the Collector, convinced all that the disease was making rapid strides. It appeared necessary to secure that the increase of work did not lead to delay in disinfection and to indifferent and hurried work. Accordingly, on the 25th January, Police Inspector Brown was ordered by urgent telegram from Sukkur. On the 27th Mr. P. R. Cadell, I.C.S., was summoned by wire from Larkana, and Mr. H. S. Lawrence, I.C.S., who happened to be in Karachi, was detained at head quarters. Further arrangements in Karachi.

The Collector notes (paragraph 45) that Surgeon-General Cleghorn recorded a favourable opinion on the plague operations in progress at the date of his visit, and it may be convenient here to summarise what was then being done. The measures were thus described in a telegram to Government, dated 20th January :—

Cleansing and disinfecting streets and gullies.

Vigilant house-to-house inspection.

Supervision of burial and burning grounds.

Thorough disinfection [with perchloride of mercury (1 in 1,000)] of plague-infected houses.

Destruction of infected clothing.

Infected huts burnt down.

Large camps ready, and inhabitants of infected quarters being induced to move into them.

Air admitted into ill-ventilated rooms by breaking holes in roof or walls.

Measures adopted.

On the 28th January, the Collector applied for the loan of 20 subordinates competent to superintend a general cleaning of vacated tenements, many of which contained property left behind by the owners in their flight. In the Collector's opinion, it would carry great weight with the populace if these subordinates were invested with magisterial powers. Accordingly, on the same date, the Acting Commissioner informed the District officers in Sind that the Subordinate Officers.

Municipality of Karachi were about to undertake this systematic cleaning and disinfecting of all houses in plague-infected quarters, and requested them to despatch Revenue subordinates of standing sufficient for investment with responsible powers. On the following day, the Collector of Customs, Mr. Coghlan, was similarly addressed. The Municipality agreed to pay a deputation allowance of from Rs. 15 to Rs. 30 per mensem, according to salary. These measures were reported to Government by telegram. The customs men joined immediately, and most of the others arrived in Karachi during the first week of February. Among the first was Mr. Phillipowsky, of the Customs House, who proved of great assistance. The 20 subordinates were duly obtained by the hearty co-operation of the Collectors and Deputy Commissioners, and were invested with Magisterial powers by Government Resolutions, dated 1st and 15th February.

Subdivision.

Mr. Cadell had been summoned in order that the work in Karachi might be subdivided under responsible officers, and on the 30th January it was arranged with the Collector that the infected portions of the town should be divided between Messrs. Lawrence and Cadell and Inspector Brown, with separate Sanitary establishment and Revenue subordinates allotted to each. Thus began that subdivision of the town under Superintendents which proved the backbone of plague management. Mr. Gloster, I.C.S., Joint Judge, joined a few days later of his own accord, and allowed of still further subdivision of the worst part.

On the 6th February, in a letter already quoted, the Acting Commissioner had informed Government that a further object in placing officers of the rank of Assistant Collector in superior charge was that it was desirable by the free movement of officers of tact and position among the people to endeavour to allay the panic.

Position of affairs
at the end of
January.

At the end of January the situation was this. Though the disinfection of individual rooms was being carefully done with perchloride of mercury (1 in 1,000), the best possible disinfectant, the work had fallen into arrears. One advantage of quick disinfection was that it usually hastened evacuation. When work was in arrears people were not leaving their houses quick enough, and one after another of a family fell victims. And there was no medical treatment. It was considered of paramount importance to cleanse and disinfect the shut-up houses, because at this stage the strain had so far broken down the Municipal organisation that it had become impossible to ascertain with certainty all the houses in which sickness or death had occurred. It was therefore decided to take up the work street by street, and do each house from basement to roof systematically. But

no sooner had the first Superintendents been appointed and their gangs of masons and coolies—each gang under a revenue subordinate as supervisor, with disinfectants, ladders and limewash—been supplied than it was found that a hard day's work from sunrise would barely enable them to overtake the preceding night's sickness and mortality. And this was essential so as to use the cleansing as a means of turning out the surviving members of the family. Dr. Emptying Cleghorn's assurance that turning out the healthy was the right policy, houses. and should be continued, came at the right moment. Only, instead of attempting to empty the first infected portion of the town in the hope that the disease might be thereby localised, the prime object was now to empty each house immediately it became infected; that is, the sick person was left in the house with one or two relatives in attendance, and the rest must be moved. The disease, though no longer confined to the old town and rapidly developing in the adjacent market and Napier Quarters, was still central, and every exertion was to be made to secure immediate disinfection, rapid removal of the healthy, and at least some treatment for the sick. But, to do anything at all, it was primarily necessary to win the public confidence.

On the 1st February, the town was visited with Mr. Tahirram, the President, and Mr. Framroz, the Mukhtyarkar. There had been during the preceding 24 hours the unprecedented number of 59 cases and 51 deaths. Messrs. Lawrence, Cadell and Brown were found full of work. Next day, the Judge, Mr. Hart Davies, though on the eve of retirement, nobly volunteered, and thereafter till he left moved among the people, side by side with the Acting Commissioner, with excellent effect. The people recognised that, when the Judges, Messrs. Hart Davies and Gloster, worked with the Executive and Municipal officers in their streets, a great effort was being made for their relief. The 2nd of February had dawned on 50 deaths, and the 3rd broke with 51. It was the climax, as already said. Messrs. Gloster and Barker, Abkari Inspectors, were allotted sub-divisions, and Surgeon-Captain Arnim was asked to take charge of the Sadar Bazaar. The Sadar Bazaar was at that time quite free, but it was the commencement of appointing Superintendents in advance of the plague, so that the disease might find no filth wherein to lodge and germinate. Soon the streets all over Karachi were almost impassable for heaps of burning rubbish and carts removing what would not burn, while lime washing by owners or Municipal agency became nearly universal. Surgeon-Captain Arnim was specially successful in getting the owners and occupiers to do the work personally under repeated inspection,

and this example was quickly followed and so relieved the overstrained officers. On the 4th there were 43 deaths, on the 5th 35, but the 6th recorded 58 cases and 52 deaths, and new efforts were called for. But it was the extreme point touched, and the disease began to yield, and never afterwards got out of control. Mr. Crouch, the Public Prosecutor, had unsought, quietly added himself to the band of Superintendents, and Mr. Cumming, the Port Trust Secretary was another valuable addition, every man working the whole day long meeting at the Denso Hall, or other appointed spot, between 6 and 7 A. M., to get the returns of the day before and muster gangs, and working on till dark, only returning for breakfast. By the 11th February, the arrear work in disinfecting houses in which plague cases had occurred had been overtaken, and from that date the systematic cleaning of houses in which cases had not occurred was commenced.

Disinfecting
work.

The scenes were heartrending. In one little close of respectable houses, all within a few yards, 21 plague death-marks could be counted—6 and 7 deaths in one house. There had been a stampede of the healthy families from the badly infected places, and many had removed with their first sick relative to other parts of the town, but there was no panic in the sense that anything was noticeable in the streets. Only when houses were entered was the state of affairs disclosed, and then it was good to see the devotion, ignorant though it was, with which the survivors would lay out their dead and attend the funeral. The Acting Commissioner endeavoured, for the sake of example to the people and the preservation of the workers, to insist on disinfection, by spraying in the manner appointed by Doctors Kaka and Arnim, preceding the advance into the houses. But there was as noble and devoted a band of officers and men as could be gathered together whom nothing would restrain.

As an example of the intense anxiety of these days, after a long morning with Messrs. Hart Davies and Cadell, in the evening it was reported to the Acting Commissioner that Mr. Cadell was down with fever. The Civil Surgeon was sent for, and took the temperature. It was normal—not plague; but the shock to the Acting Commissioner when he saw the officer he had summoned suddenly, as it were struck down, he will not easily forget. At that time, the immunity of Europeans was not realised, and the Acting Commissioner had served under his well-known father, Colonel Cadell, and the son followed the father in disregard of danger.

Disposal of
bodies.

With the increased mortality, it was feared there might be careless burying, and with increased stringency that bodies might be surreptitiously removed. From the beginning of January, one or two

police had been posted but from the 3rd February the District Superintendent of Police was requested to take the burial and burning grounds under his personal supervision, and thereafter the police returns became a very useful addition to the daily municipal record, allaying any suspicion lest deaths might be escaping record.

In the letter to Government, dated 6th January, it was stated that the presence of a thoroughly competent Muhammadan medical officer would greatly strengthen the Health Officer. The Principal Medical Officer had been able to supply one of the best in Sind, Sheikh Abdul Rahman. This Hospital Assistant came from Mirpur Khas and soon commanded respect. Government were good enough to procure an Assistant Surgeon Subhan Ali from the North-Western Provinces, and the Municipality obtained Mr. Fazul Ahmad, a private practitioner, from Amritsar. All these were at work by the first week in February in the trans-Lyari quarter.

The trans-Lyari quarter is separated from the town of Karachi by the broad, sandy bed of the Lyari. On the flats beyond are clustered 20 settlements of poor Muhammadans of different tribes, fisher people Sidis, Mekranis, Pathans, Baluchis, Brahuis, etc., each in their separate village. Twelve of the settlements are mostly only reed and mud-plastered huts. The remaining eight are of inferior houses of a permanent type. The sites of the huts are held on leases from the Municipality, terminable at one month's notice. Among these people, numbering at the census over 22,000, but estimated now at over 30,000 or one quarter of the present estimated population of Karachi (124,000), plague did not show itself till the 10th January, when two cases occurred, and up to the end of January cases were few and isolated. But, with the beginning of February cases multiplied rapidly, and on the 6th February there were 22 cases and 17 deaths. With the first indication of coming trouble resort was at once made to the contemplated employment of Muhammadan agency. Sardar Khan Bahadur Muhammad Yakub, Deputy Collector of the Nara Valley, who had done distinguished service in the suppression of the dacoities in the Thar and Parkar District a year ago, was sent for and placed in charge of the quarter, as though it were a sub-division. To assist him, Mr. Giles recommended Khan Sahib Rasul Baksh, a very happy selection, who was brought from his Mukhtyarkarate of Kambar in the Larkana sub-division. A few Muhammadan supervisors were added. The Sardar at once set to work to get hold of the tribal headmen and to provide segregation huts, with Mr. Strachan's ready aid for each tribe.

On the 3rd February, also a telegram was despatched to Government, asking for a loan of a lakh of rupees for the Karachi Municipality.

Muhammadan
medical officers.

Plague in the
trans-Lyari
quarters.

Appointment of
Muhammadan
officers.

Loan for
Karachi.

Appointment of
two Commis-
sioned medical
officers.

Difficulties in the
way of segregat-
ing sick.

Work by Drs.
Niblock and
Cornwall.

and for the deputation of two gazetted medical officers. The Assistant Collectors and other officers working in the town were becoming pretty well known, and it was hoped that access to the sick might now be obtained if a medical officer moved about in their company. In writing to Government on the same day February 3rd, it was stated that the compulsory removal of the sick would probably be the most effectual of all remedies, and was the one advocated by the medical officers; but it was hopeless to work counter to the popular feeling, and the Muhammadans were so far particularly obstinate. A rule had been promulgated by the Municipality that an infected house was to be compulsorily vacated by the surviving inmates. These, it was found, cling to their house till as many as 6 or 7 deaths practically annihilate the family.

Government responded immediately, and Surgeon-Lieutenants Niblock and Cornwall reported themselves on the 12th February. The Acting Commissioner told them that two duties of the utmost importance lay before them. They were to induce people to come to hospital, and they were by their acts to give the lie to the stories in circulation that the aim of Government was to stamp out plague by poisoning the sick. Right nobly they discharged the trust. Next morning, the Acting Commissioner missed Surgeon-Lieutenant Niblock from his side. The young doctor had discovered a house full of sick, and was already at work arranging the helpless. Presently, he was to be seen with an attendant carrying a small box, rigged up as a little potable medicine chest going his rounds, welcomed by nearly all, and the effect of the treatment was electric. Dr. Cornwall was doing the same splendid service across the Lyari. Without hospitals, without appliances, asking for no help, and ignorant of the language, these young doctors in a few days had won free entrance everywhere. First the sympathy and fearlessness of the officers, moving among the people with gentle firmness, and then the healing treatment and the all-day long devotion and skill of these two young medical officers convinced the poor there was nothing to dread.

Plague hospital
in Karachi.

With doctors in the city and doctors at the Railway stations patients began to be taken to the Civil Hospital. Mr. Giles visited the hospital and finding plague patients in the same compound with the ordinary civil sick, he arranged with the assistance of Mr. E. Giles, the Educational Inspector, for making the Government High School, next door to the Civil Hospital, available for ordinary patients, while the Civil Hospital became the Plague Hospital. Throughout the plague and wherever it broke out, the schools were the only large

suitable airy buildings available. Many a head of a department might have hesitated. To Mr. E. Giles the most hearty thanks of the province are due for placing freely at disposal colleges and schools, thus enabling the best possible accommodation to be given to the sick in the approaching heat of Sind, and saving Government and the Municipalities a heavy expense. Government approved the arrangement by wire, and Surgeon-Lieutenant-Colonel Henderson, with Surgeon-Lieutenant Niblock's assistance, soon had a fully equipped plague hospital, of which subsequently Surgeon-Lieutenant Niblock took charge. Schools as hospitals.

The pleaders and other native gentlemen had been desirous to give a farewell entertainment to Mr. Hart-Davies. Mr. Hart-Davies begged that, in consideration of the suffering around, the money might be devoted to some public object. A meeting was called at Government House, and it was decided to raise a relief fund, so that those working among the people might be placed in funds. Mr. Motiram Advani, Barrister-at-Law, kindly undertook the task of collecting. The ladies of the station gave a successful concert in the Frere Hall, and eventually Mr. Advani produced the substantial assistance of some twenty thousand rupees, for which he deserves the gratitude of many. Each Superintendent was at once supplied with a permanent advance. Furniture was placed in the plague hospital, and stimulants and food and comforts were liberally supplied, and soup kitchens opened across the Lyari. One thing was yet lacking, and that was nurses. The good work done by the Convent Sisters in the Famine Hospital in Bangalore was recollected. Sister Heriberta, of the Karachi Convent, with the approval of the Revd. H. Jürgens, responded without hesitation, and in a few days the Sisters were heartily welcomed by Dr. Henderson, who had made, with Mr. Advani's help, every arrangement for their comfort. The Sisters occupied the upstairs or European wards of the hospital and lived there for several months, nursing the 60 to 100 sick below by day and by night, and entered on the dangerous duty with happy self-sacrifice. They were soon beloved. Later on, they were joined by several nurses paid from the Charitable Fund and were assisted by the two Misses Carey of the Zenana Mission. The agreement was that there was to be no mention of religion. The light that shone from the healing of the sick under such loving ministration could not, however, be hid. Relief fund. Nurses.

Another act also impressed the native community. Special prayers were offered in church from Sunday, the 14th February, and on the 19th February a special intercessory service was held by the Revd. F. Sandberg in Trinity Church, which was largely attended.

The first fortnight of February was a time of earnest battling with a foe that literally walked in the darkness. His Excellency the Governor on the 11th flashed a message that cheered all, thanking all for the determined efforts to fight the plague, and that His Excellency was watching with closest interest.

Spread of the
disease beyond
Karachi.

While this battle with pestilence was being fought in Karachi, cleanliness against dirt, light against darkness, fresh air against foul, scattering against overcrowding, and a free use of disinfectants, there were signs of coming trouble in other places. For a time, the hope prevailed that, with rigorous segregation, the germs would not thrive in the dry climate of Sind. Nor was this hope altogether fallacious.

Hyderabad,
Kotri and Tatta.

On the 27th January a circular was issued, inviting attention to deaths from plague increasing up-country, and notably at Hyderabad, Kotri and Tatta. So far no local cases had occurred, but it was essential to prevent any person suspected of plague entering a town, and isolation, segregation and disinfection, with provision of huts and health camps, were recommended. Surgeon-General Cleghorn, through the Deputy Sanitary Commissioner, pointed out the extreme importance of compulsorily removing the healthy persons from an infected house, and the letter was forwarded on the 29th to all district officers. The Sanitary Commissioner, Surgeon-Major Clarkson, in a letter, dated 4th February, urged the removal of the sick person from the house in all cases. The circular of the 27th had stated that, if it could be done, it was better to remove the sick persons, and that all the clothes and bedding, including the wearing apparel actually worn, of the family should be disinfected. These directions to District officers appeared to leave them full power of action, and were therefore not modified.

Karachi
District.

Tatta.

From first to last, there occurred in the Karachi District, outside Karachi, no more than 238 cases and 178 deaths. Of these, only 53 and 41 were local cases and deaths. The disease only took root in Tatta, with which its railway station, Jungshahi, must be included, and in Kotri. Tatta is a town of about 10,000 inhabitants, about 13 miles from Jungshahi. It is a favourite resort of the upper classes of Karachi, and is on the main route to Cutch. From the middle of December to the week ending the 19th February, 31 cases and 21 deaths, all imported, had occurred in Tatta. The influx then appears to have ceased, and no more deaths were reported till plague broke out locally in the week ending the 26th March. Thereafter, the outbreak was local, and practically ceased early in May. That the epidemic was kept out of the town so long, was due to the

unsparing and well-directed efforts of the Assistant Collector, Mr. M. D. Mackenzie. To that officer is also due the credit of starting the first observation camp. Persons were medically inspected at Jungshahi, and not allowed to hire conveyances for Tatta unless certified as healthy. On arrival at Tatta, they were taken to the camp and not allowed into the town. Cases were consequently hidden away in Jungshahi, and about the third week in February a sharp little local outbreak was the result. There is only a population of some 200. Mr. Mackenzie at once appeared on the scene, adopted energetic measures of evacuation and thorough disinfection, and there were no more cases. The local cases in Tatta began, as stated, towards the end of March and, though never exceeding 4 or 5 a week, caused grave anxiety for five weeks. Mr. J. P. Vaughan, I.C.S., succeeded Mr. Mackenzie on the 23rd April, when the disease bid fair to seize the town in earnest.

FATAL LOCAL CASES.

				Cases.	Deaths.
Week ending 26th March	...	...	...	2	2
" " 9th April	...	...	...	1	1
" " 16th "	...	...	...	4	3
" " 23rd "	...	...	...	5	3
" " 30th "	...	...	...	4	5
" " 7th May	...	...	...	2	3
" " 14th "	...	...	...	1	1

Mr. Vaughan, having had no plague experience, was first taught by the Collector in Karachi and then sent to Tatta with Surgeon-Major Baker, a trained gang of disinfectors under a selected Supervisor, and a nurse. The above figures depict the rapidity and thoroughness of their work, as in the week ending the 30th April the number of cases went down instead of going up.

Kotri is on the Indus and is the railway station for Hyderabad, Kotri, from which place it is separated by the river and a couple of miles of road. It is a small town of about 8,000 inhabitants, and on Mr. Brayson, the Deputy Collector in charge, devolved the difficult duty of protecting the place. As in Tatta, up to the third week in February, dropping cases came in from Karachi, deterred probably by the medical examination on the steam ferry from going to Hyderabad. Then there was a lull, and not till the week ending the 26th March did the first local case show itself at the same time with cases imported from Hyderabad, where the disease had just broken out virulently. Mr. Brayson made Kotri his head-quarters and, well assisted by Assistant Surgeon McMullen of the North-Western Railway, defended his charge from the simultaneous incursion from Karachi and Hyderabad, and, by enforcing segregation in huts, got rid of the local cases for 17.

Epidemic
Diseases Act.

With the passing of the Epidemic Diseases Act had come increased powers. Sanction to the following measures, which were all already in operation under Municipal rules, was solicited by telegram on the 9th and granted by Government on the 11th February :—

Powers.

The Commissioner and District and Sub-divisional Magistrates were empowered to act or to empower any person by name to act as follows :—

- (a) Enter or break open any house or room, day or night, disinfect, limewash, collect and burn rags, rubbish, pull down, burn, open walls or roofs, burn suspected bedding, clothing and other articles, and disinfect persons or their property.
- (b) Order persons or classes of person to leave certain place for another, or prohibit leaving given area, prohibit communication between certain areas, prohibit entrance of persons within prescribed area, make regulations for inspection of travellers, by land or water and, if necessary, their detention and segregation, and destruction of suspected articles.
- (c) Direct that any place for supply or preparation or storing of food be closed, or the food removed, if so permitted.
- (d) Direct compulsory notification of sickness or death from any cause.
- (e) Value and pay compensation for all bedding, clothing, etc., or temporary huts destroyed, and after summary inquiry of any valuable article or house.
- (f) To give notice to house holders or occupiers within 48 hours to limewash and clean their premises or specified parts, and to burn or collect dirt, rags and rubbish for cartage.

The Commissioner was also empowered to delegate the following powers to any person by name :—

- (a) Remove any person suffering or suspected to be suffering from plague, or likely to have contracted the disease, to any place; detain him till permitted leave.
- (b) Prohibit re-occupation of any house without permission.
- (c) Regulate removal, burial or burning of corpses and general conduct of funerals.
- (d) Prohibit import or export of specified articles.
- (e) Determine in what manner and by whom any expenses, including compensation, be defrayed.

Lastly the Commissioner might make subsidiary rules to carry out any of the above powers, and might require any Municipality to act in any of the above ways in such manner as the Commissioner might prescribe and to employ such establishment as deemed necessary.

These powers were so very wide that on the 17th February a circular was issued, desiring that every officer and subordinate should recollect that exceptional powers carry with them increased responsibility, and the powers must be used with consideration, tact and judgment, and only be put in force when and so far as the necessity for preventing spread of the disease required.

On the 19th January, the Collector of Hyderabad, Mr. C. G. Dodgson, I.C.S., had reported the arrangements made for cleaning Hyderabad town and other large towns in his district, and for medical examination and detention on the steam ferry across the Indus and at principal railway stations. On the 5th February, the first* local cases in Sind, outside Karachi, were reported by the Assistant Collector, Mr. N. B. Divatia, of the Hala subdivision of the Hyderabad District to have occurred and Tando Alahyar, a Railway station and Municipal town of over 4,000 people. Five such cases had occurred during the last fortnight of January, and four had proved fatal. The Collector of Hyderabad was asked to report whether segregation of the healthy found in the infected house and isolation of the sick had been rigorously enforced, and whether disinfection was thorough. These, being the first local cases, caused anxiety. The reply received was that a man arrived in Tando Alahyar from Karachi on the 10th January and died of plague on the 12th. His two sons, who had not been to Karachi and who lived with him, fell ill, and they died on the 19th. In an adjoining house, practically all one building, two persons, who had also neither left the town were attacked and died on the 26th. Mr. Divatia went to Tando Alahyar on the 7th February, and found that clothing and bedding had been burned and houses disinfected. On his arrival, he introduced segregation, and the Collector's commendation of his work was borne out by the fact that, though Tando Alahyar continued to be a source of anxiety till after the middle of April, yet cases were only on one occasion in excess of one a week, and the total cases and deaths did not exceed 18 and 15, respectively—a testimony to Mr. Divatia's prompt enforcement of orders. There was no other local outbreak in the Hyderabad District.

On the 17th February, inquiry was requested as to the accuracy of the returns from Hyderabad town that all cases occurring were

* A case at Tatta in January was considered doubtful.

imported. At that time, 33 cases and 28 deaths had been so described as under:—

			Cases.	Deaths.
Week ending 8th January	...	...	2	2
" " 15th "	...	...	9	8
" " 22nd "	...	...	5	5
" " 29th "	...	...	3	2
" " 5th February	...	...	3	3
" " 12th "	...	...	6	5
" " 19th "	...	...	5	3

On the 10th February, the Collector had been asked to give up his tour and make Hyderabad his head quarters, which he did immediately, reaching Hyderabad on the 17th. With the exception of a flying visit to Tando Alahyar on the 27th and 28th, Mr. Dodgson remained at Hyderabad till his health obliged him to take furlough. On arrival Mr. Dodgson found much municipal activity, though the measures he had urged during a visit paid to Hyderabad at the end of January had not progressed so rapidly as he had hoped.

House to house
inspection.
Divisions of the
town.
European officers

The President of the Municipality is Mr. Hiranand, who, like Mr. Tabilram in Karachi, stuck to his post, and evinced a true appreciation of the gravity of the visitation and the necessity of active and cordial co-operation on the part of the people. The disease was new, and the measures must be new. At the end of January, house-to-house inspection was commenced by Municipal officers, and in the middle of February the town was divided into 10 divisions, each of which was placed, at the suggestion of Surgeon-Major R. Baker, the Civil Surgeon, in charge of a European officer, the military officers cordially volunteering to assist. Each divisional officer had working under him one or two subdivisional officers, who were mostly Municipal Commissioners. The efforts of these officers, were directed to cleaning and limewashing the 12,000 houses that composed the town. In passing it may be remarked that this work, as in Karachi, was most carefully executed.

Subdivisional
Officers.

Cleaning.

Cases at first
treated in
own houses.

In a letter received from the Civil Surgeon on the 9th February, Surgeon-Major Baker remarked that the cases were as a rule treated in their own houses and, after the case ended, the house, bedding, etc., were dealt with. The attention of the Collector was drawn to this remark. If the Municipality wished to escape the scourge, they must at the very beginning isolate the sick and segregate the family and attendants. If this could not be done by taking the whole family, including the sick person, to sheds outside the town, then the healthy

members must be made to vacate, leaving only necessary attendance. No persons arriving from Karachi should be allowed to enter the town till they have been under observation for 10 days. A copy of these instructions was sent for guidance to the Collector of Shikarpur and to the Deputy Commissioners.

Mr. Dodgson acted with energy. He insisted on the Municipality making house-to-house inspection a reality, and stated that, where the sick person was not too ill to be moved, the removal to sheds would be enforced. He explained that detention against arrivals from Karachi had already been discussed with the Civil Surgeon and the President, but owing to the subterfuges that would be restored to after a day or two, it would be impracticable to recognise a person as hailing from Karachi. Later on at Shikarpur this difficulty was met by stopping everybody, but at this period of the epidemic the authorities had enough discontent to deal with inside the town. Segregation enforced.

On the 23rd of February, Mr. Dodgson proceeded to take action himself, and with the assistance of Mr. Hiranand, the President, he caused the evacuation of about 100 families from a group of houses where cases had been increasing. On the 17th February, Surgeon-Major Baker had noted that the interval in one case of 18 days after arrival from Karachi was a questionable "imported" case. On the 26th, or three days after the commotion occasioned by the evacuation, the first two local cases occurred, though not reported till the 28th. During the week ending the 26th February, there were no cases, local or imported. Then began the plague, though at first, as in Karachi, very slowly :— Evacuation.

				Cases.	Deaths.
For week ending 5th March	...	...	...	3	2
" 12th "	...	...	...	7	7

When the local cases began Mr. Dodgson found that a large family of goldsmiths had allowed 3 deaths to take place in their house before the news spread. He reported that all the houses had been disinfected and cleaned, the plaster scraped off walls and floors, and the roofs taken off. All the inmates were promptly removed to camps outside the town, with the exception of two native ladies, and all the neighbouring houses to each infected house were vacated. Gangs of coolies were placed under the divisional officers, and depôts for lime and disinfectants established in convenient spots. Disinfection and evacuation.

On the 19th February a copy of a telegram was received from Government urging the importance of watching roads leading from infected places. These instructions were on the 20th sent to all Watching roads from infected places.

District officers, with the suggestion that police should be stationed under a responsible officer at suitable points to stop and send for examination by a medical officer any one with severe fever trying to enter the town. The Collector of Karachi was asked to take steps at, say, a distance of a day's journey from Karachi on the main road to detain any sick or suspicious persons attempting to leave Karachi.

Sukkur.

On the 17th February, a report was received from the Civil Surgeon, Sukkur, Surgeon-Major Corkery, stating that a case of plague was reported on the 12th idem, and in the face of great opposition he had removed the patient, a girl of 10 years old, accompanied by her mother and brother, to the sheds prepared for such cases. Dr. Corkery disinfected the house. This was the first case of plague reported from Sukkur, and the first case of forcible removal of a patient anywhere. The result is significant. Ominous silence followed, and soon it appeared that the people of all ranks had banded themselves together with one accord to defeat the authorities. On the 26th February, Dr. Corkery reported that, besides the one case which he saw and removed, a few suspicious fatal cases had occurred which were not brought to notice and which the relatives had palmed off as deaths from natural causes. A very large number of the population immediately deserted Sukkur. There was a rush of the healthy to Shikarpur, but the measures there and in other big towns were more or less dreaded, and the bulk of those who had sick in their families—and there appear to have been many—fled to the neighbouring villages. The country is well cultivated in that part of Sind, and villages are pretty close together. A day or two after the removal of the girl, the sister-in-law of a Municipal Commissioner took the disease and was immediately secreted in a village 5 miles off, where she died poor creature, "possessed of the devil," as her brother-in-law pleaded. How many perished in these villages before their condition was known and help could reach them it is difficult to say, but in the Sukkur Taluka the excess of reported deaths over the normal was 436. The fugitives also crossed over to the left bank of the Indus and infected Rohri and the villages in its neighbourhood. Some 10,000 people are said to have thus suddenly decamped.

Compulsory segregation of first case.**Flight.****Detection of concealed cases.**

Surgeon-Major Corkery set himself to find out the truth. He traced one family to Rohri, where 4 deaths occurred. Spies were placed over a suspected lane in New Sukkur. A sick man was caught as he was being placed in a boat with a temperature of 105, and delirious. This was on the 25th. Next day, the 26th February, the same date on which the first two local cases occurred at Hyderabad, a

search was made in the lane. One dead boy and two sick were found and these were removed to the isolation sheds, and the other inmates to the health camp. There was only slight opposition. Clothing and bedding were burnt, and the houses fumigated and locked. It is to be regretted that the Municipal Commissioners of Sukkur lent no assistance.

The Collector of Shikarpur, Colonel Mayhew, was asked to go to Sukkur, his head quarters. He had already been there, and anticipated the request. Sukkur, like Karachi, shows no imported cases. All were local, and though Karachi people went to Sukkur, none were traced to have died of plague. By the 12th February, when the girl was discovered, there must have been a good many sick in Sukkur to give rise to the panic that followed her removal. In the neighbouring town of Shikarpur, plague measures aroused no panic, because the towns people had no sick in their households. The early figures for Sukkur are—

Early period of the Sukkur epidemic.

			Cases.	Deaths.
For week ending	12th February	...	...	1 0
"	19th "	..	...	0 1
"	26th "	...	...	4 1
"	5th March	...	...	6 8
"	12th "	...	...	14 9

On the 3rd March it was evident that plague had broken out at Hyderabad as well as at Sukkur, and a telegram was despatched to both Collectors, pointing out that, local plague cases having occurred, migration of the population would commence, and medical inspection of all departures by rail should be arranged, and at exits by road plague authorities should be stationed to detain sick and suspected for medical examination, and no plague case be permitted to depart. A second chain of inspecting stations should be made at suitable points at 10 to 15 miles distant, and every effort made to prevent sick persons travelling. Any sick found to be detained in hospital. On the 4th March, the measures to be adopted were recapitulated for the guidance of the Collectors and to strengthen their hands. Private hospitals were the alternative to forcible removal, but always a discretion was left.

Railway and road inspection.

The Collector of Hyderabad reported that 16 medical students were being placed on the main roads leading from Hyderabad, assisted by police. Nice huts were erected for them, and it thence forward became very difficult for any sick person to get away. The Hyderabad-Rohri railway station and the steam ferry across the Indus were carefully watched for departing families. The burial and burning grounds were under close supervision, and no concealment

Watching the roads from Hyderabad.

was now possible. The exodus of healthy persons was most desirable, the town being overcrowded. The Collector of Shikarpur reported that he had established cordons, but the rush had taken place and guarding the roads was of little use. It was pointed out that this was true enough, but as each new street got infected some would still try to escape the measures being taken, and this must be checked. The arrangements for examination of passengers leaving the railway station were also detailed.

Special danger of the outbreak at Sukkur.

Sukkur and Rohri are practically one place, connected by the Lansdowne Bridge over the Indus, and with railway lines to Hyderabad to Karachi, to the Punjab, and to Shikarpur and Baluchistan. A more dangerous spot for an outbreak of plague could hardly be named, and with the large important town of Shikarpur, teeming with Karachi, Hyderabad and Sukkur fugitives, and having business connections all over India and as far as Bokhara in Central Asia, situated within 75 miles of Sukkur the progress of the epidemic was watched with the keenest anxiety, and the resources of the province were strained to check its apparently resistless march northwards.

Assistance of a special Commissioned Medical Officer.

The Principal Medical Officer was asked to permit Surgeon-Major Baker to visit Sukkur and assist Surgeon-Major Corkery in making a thorough house-to-house inspection. Surgeon-Major Baker arrived at Sukkur on the 8th March, and under date of 12th idem reported that he had found two plague cases in the isolation camp and 20 persons in the health camp, one of whom had just developed plague. Old Sukkur, where the wealthier portion of the community lived, and which was separated from New Sukkur by the European and railway quarters, was not deserted to any appreciable extent, but three-fourths of the inhabitants of New Sukkur had left for the surrounding villages.

Flight from New Sukkur.

Increase of the staff.

On the 10th March, Mr. W. H. Lucas, I.C.S., who had just been relieved at Jacobabad by Mr. M. D. Mackenzie, was put in orders as Personal Assistant to the Collector of Shikarpur, as no extra establishment had yet been sent there and Mr. Cadell had been taken for Karachi. But the Collector did not then see the necessity, and Mr. Lucas was directed to proceed to Karachi to acquaint himself with plague administration there.

On the 23rd Surgeon-Major Baker, having been placed on special duty, visited Shikarpur and with the Collector inspected the arrangements there.

Precautionary measures at Shikarpur.

Surgeon-Captain C. Milne, I.M.S., had been deputed to Shikarpur on the 19th March owing to the occurrence of imported cases, of which to the date of his arrival 14 cases had occurred, and

because of the increasing death rate. Surgeon-Captain Milne at once, of his own motion, began examining the dead bodies, and where any objection was made called in Lady Doctor Nash. This thoroughness elicited the fact that the increased death-rate was largely due to the increased population, and the mortality was mainly among insufficiently nourished infants and very old people. Search parties had been instituted, and their working was improved during Surgeon-Major Baker's visit. There was an excellent spirit of co-operation among the people, and this must be attributed to the healthy influence of Mr. Dyaram Gidumal, the Judge, and Mr. Mohsin Badrudin Tyabji, the Joint Judge, seconded by the City Panchayat and the local officials.

Mr. Mules, the Deputy Commissioner of Jacobabad, had imposed detention under observation at Jacobabad with success. This was now asked for by the people of Shikarpur and was now sanctioned. Writing on the 19th February, the Collector of Shikarpur had concurred with the Acting Commissioner that the quarantine then imposed should be removed, and the experience of Surgeon-Captain Milne soon showed that, without European supervision, the quarantine would not have been successful. By the time detention was reimposed, the leaders of Shikarpur society were determined to make it effectual. All through, Colonel Mayhew gave himself heart and soul to the defence of Shikarpur, and reposed in Surgeon-Captain Milne and Surgeon-Captain E. S. Clark, A.M.S., who was subsequently sent to assist, the most unstinted confidence, which maintained their authority unquestioned.

Meanwhile in Karachi improvement was perceptible. Disinfection of houses was up to date and general cleaning in full swing, and the unaffected quarters were being taken in hand in advance of the attack. Surgeon-Captain Arnim was now fully occupied, having in the middle of February been placed in charge of the suburban quarters in addition to the Sadar Bazaar. The Deputy Sanitary Commissioner was so valuable as a general guide that it was found impossible to give him charge of the Nasarpuri Camp, which was looked after by Mr. Strachan.

Indeed, at this time every one's strength was being put forth in the endeavour to limit the area infected. Major Morris, Karachi Artillery Volunteers, Port Trust Engineer, took charge of Kiamari and Manora. He segregated every case with extreme care, but cases at Kiamari did not cease till the old village of huts was burnt and the people disinfected and moved to a new site by the Plague Committee. The Manager, North-Western Railway, Colonel Brackenbury, R.E., paid

Improvement at Karachi.

Kiamari and Manora.

a visit to Karachi on the 18th February and organised the protection of the Railway quarter, and throughout, as will appear, lent the fullest aid of his department to the Civil officers.

Camps for subordinates and clerks.

Mr. Giles had arranged with the railway administration for special trains to run between Karachi and the two neighbouring stations of Landhi and Malir, where he and several of the European merchants had erected camps. By this means, subordinate officials and office clerks and coolies were safely housed out of reach of infection and were able to come to work daily. This was a very successful scheme, and a great boon to the mercantile firms who were being deserted by their establishments. Major Morris was similarly active in protecting the shipping.

Detection and segregation complete.

By the end of February, the Collector reported that few cases now remained undiscovered, and hence the removal of the healthy was at once universally carried out. To this must be attributed the progress that was being made as shown in the decreasing mortality, as also to the sick being rapidly brought under medical treatment. At this time Surgeon-Captain Borradaile, A.M.S., arrived from England. His report on the measures in Karachi and the Acting Commissioner's report on the rest of Sind, which that officer drafted, were submitted to Government, and throughout Surgeon-Captain Borradaile lent very cordial assistance and readily volunteered for any duty.

Segregation.

In Sukkur the stringent removal of the sick had led to the sudden flight of some 10,000 people. In Hyderabad its most rigorous enforcement, under the determined action of Mr. Dodgson, was failing to check the outbreak. In Karachi it was gradually being introduced, and in some quarters, as Kiamari, was insisted upon from the very first by Major Morris. Under Sardar Muhammad Yakub Khan in the trans-Lyari quarter, where he had to contend with much fanaticism among the Muhammadans, isolation of the sick was only becoming possible, but by the middle of March segregation of infected families was the rule. Segregation camps under the magic wand of Mr. Strachan sprang up everywhere. In these days it was necessary to humour prejudice by having the huts near each community. It was a long time before the fancied degradation of living in a hut was subdued, and to the last the better classes disliked it, as was natural.

Convalescent home.

Early in March, the need for a convalescent home, to get the recovering patients out of the depressing influence of the mortality of a plague hospital and to relieve crowding, became pressing, and Surgeon-Lieutenant-Colonel Henderson, to whose solicitude and organisation the hospital owed much, suggested that the newly built and

unoccupied Lady Dufferin Hospital should be utilised as the convalescent ward. It was just opposite the plague hospital, and in every way suitable, and upstairs had accommodation for European and other patients who could not be treated in the plague hospital. The Committee agreed, and the happy faces of the convalescents testified to the wisdom of the change.

The 19th of March, the crowning day to the Sardar's work across the Lyari, saw the voluntary removal by the Muhammadan communities of all their sick, and 80 patients were during the day safely deposited in the isolation sheds, and all came under medical treatment. Mr. Giles, who had devoted himself to this quarter, was justly proud of the great achievement. Some 40 malcontent families withdrew to some distance, and from that date there was no reluctance but eagerness to isolate every case throughout the villages of the large Trans-Lyari tract.

Evacuation of
Trans-Lyari
Quarter.

The Jail is a striking example of segregation. It is situated in the heart of the town, and for some time plague circled it. Surgeon-Lieutenant-Colonel Henderson had taken every careful precautions. No new comers were admitted till stripped and bathed, and reclad in fresh clothing and kept for some days apart by themselves. Notwithstanding, one prisoner caught plague. He had been five months in jail. He was removed to the plague hospital and recovered. It is supposed a warder may have introduced the germs. No other case occurred. Nor did any case occur in the Hyderabad Jail, where, also, Dr. Jackson was minutely careful over every detail.

Example of the
result of segre-
gation.

With plague broken out at Hyderabad and Sukkur, and threatening at Shikarpur, and villages in different quarters occasioning anxiety, the dearth of officers made itself felt. Some of the staff given to Karachi must be withdrawn and their places supplied, and more medical officers must be obtained. As the disease approached cantonments, it seemed desirable also to reconsider the position in Karachi itself. Just about this time, the Bombay Plague Committee was formed. Something of a similar character for Karachi seemed to offer exactly what was required. On the 10th March a memorandum was drawn up, pointing out that, though plague in Karachi had been held in check, it had not been stopped and was constantly reappearing in a new quarter. It was clear that the best results had been obtained by separation between the sick, the possibly infected and the healthy, and to the perfecting of this separation, to efficient guarding of the camps, to house-to-house searching the full strength of the administration should now be

directed, and the memorandum closed by suggesting the assistance of the Brigadier-General. A large meeting of plague officers assembled on the 12th, at which the Principal Medical Officer was present. The opinion was strongly in favour of working on existing lines. The plague was decidedly not gaining ground, the arrangements for dealing with it were gradually being made more stringent, and beyond pushing the removal of the sick to hospital, no change was required.

Private hospitals
beginning to fill.

It should be mentioned that at this time the private hospitals were beginning to fill, and that Seth Vishindas, a wealthy and philanthropic citizen, quite fearless of plague, was constructing what developed into the best private hospital in Karachi, where he generously received Hindus and Muhammadans alike, having separate wards for each, and supplying medical and other attendance, food and medicine at his own expense. The removal of the sick difficulty, which had been such a mountain in the way of effective remedies, had thus quietly disappeared, and, as the Collector remarks, a few days later the sick were being removed to hospital as a matter, of course.

Appointment of
the Karachi
Plague Committee.

On the 20th March His Excellency the Governor of Bombay, Lord Sandhurst, G.C.I.E., arrived, and after inspecting all that had been done, appointed a Plague Committee for Karachi, consisting of Brigadier-General T. A. Cooke, Commanding Sind District, as President, with the Collector, the Deputy Sanitary Commissioner and Mr. Strachan, of the Municipality, as members, though the last named was added a day or two later. This measure was like the relief of a beleaguered garrison. Not only did His Excellency's approval encourage every one, but the General immediately threw himself heart and soul into the work, brought to bear the whole strength of the military, with unlimited officers and men and habits of rigid discipline on the existing material, and soon had the population under thorough control. In their first sittings, the Committee had the advantage of the counsel of Surgeon-Major Reade, one of the Joint Presidency Plague Commissioners. He suggested the bathing and disinfecting sheds for arrivals at each camp, the disinfection of all bundles and baggage brought to the camp, and similar arrangements on leaving. These suggestions were most carefully elaborated

Disinfection of
the person and of
clothing.

by the Plague Committee. Disinfection of the person and personal clothing had previous to this been in the background, the getting of sick and healthy out of the infected houses, and the disinfecting and cleaning of those houses absorbing all the time of the workers. Now immediate transference to hospital and camp was working

smoothly, and it was possible to perfect that control of the camps to which Surgeon-General Cleghorn had invited attention. This thorough and painstaking disinfection of the clothing and bathing of the persons in tubs with a mixture of Jaye's fluid in the water soon extended upcountry with marked effect.

On the 25th March the first military search party went out. It was very carefully organised and admirably managed, the civil officers accompanied by medical men taking charge of each party. The General had carefully instructed the men, and from that day forward there was no need for the slightest apprehension, either that the soldiers would not deal tenderly, or that the people would not welcome them. Not a complaint was ever preferred.

Military search parties.

Mr. Dodgson responded to the invitation to meet His Excellency, and returned to Hyderabad versed in all that was being done and proposed to be done in Karachi. Surgeon-Major Baker, now on special duty, on the 28th March presented a report of the state of affairs in Sukkur, which showed, as he expressed it, that the local organisation was not abreast of the disease. The Plague Committee being now well established at Karachi, it was possible to spare an officer, and Mr. Cadell was despatched that evening to Sukkur to the assistance of the Collector. Surgeon-Lieutenant A. F. W. King, I.M.S., had already taken charge of the two plague hospitals at Sukkur. Mr. Lucas, I.C.S., was also placed under the orders of the Collector of Shikarpur, and with Surgeon-Major Baker started for Sukkur on the 29th. Surgeon-Major Baker had reported that the chief difficulty in getting anything done at Sukkur was the general panic and flight. Accordingly, 200 to 300 trained Karachi coolies and masons, under supervisors, were sent up by train by the ready aid of Mr. Giles and his indefatigable Mukhtyarkar, Khan Bahadur Framroz, together with a supply of perchloride of mercury. The delay in sending Mr. Lucas to Sukkur had after all not been lost time. Mr. Lucas had spent some time in Karachi, had seen the soldiers at work, and the disinfection machinery well started, and was thoroughly competent to introduce the system cut and dry. He received *carte blanche* powers, and the Collector placed the plague administration in Mr. Lucas' hands. At the same time, on the advice of Surgeon-Major Baker, it was arranged with General Cooke to despatch 30 British soldiers of the Duke of Edinburgh's (Wiltshire) Regiment, under a specially selected officer, from Hyderabad to Sukkur. General Cooke arranged everything with the utmost celerity, and some long-abandoned barracks were immediately put in such order as was possible, and furniture and commissariat were provided by rail. Lieutenant A. E. Beadon went in command.

Soldiers and labourers sent to Sukkur.

Similarity in the outbreaks at Hyderabad and Sukkur.

The following table will exhibit a somewhat striking similarity in the outbreaks at Hyderabad and Sukkur :—

Week ending	HYDERABAD.		SUKKUR.	
	Local.		Local.	
	Cases.	Deaths.	Cases.	Deaths.
26th February 1897 ...	...	...	4	1
5th March " ...	3	2	6	8
12th " " ...	5	4	14	9
19th " " ...	42	29	28	19
26th " " ...	40	27	97	76
2nd April " ...	33	25	105	56
9th " " ...	117	58	111	75
16th " " ...	119	104	87	59
23rd " " ...	75	68	42	50
30th " " ...	49	40	17	16
7th May " ...	37	32	13	8
14th " " ...	13	12	6	5
21st " " ...	8	8	4	5
28th " " ...	1	2	1	1
4th June " ...	2	2	1	1
	...	...	Add 12th Feb. 1	Add 7th July 1
TOTAL ...	544	413	537	391

The period of intensity in each case was 8 to 9 weeks, and the beginning and ending of the epidemic almost synchronised.

Hyderabad.

The Acting Commissioner left Karachi on the 1st April and first visited Hyderabad. He paid two other visits to Hyderabad but it will be convenient here to finish the history of the Hyderabad

outbreak. Hyderabad, like Karachi, consists in part of a closely packed old town, with narrow lanes and blind alleys. Its situation upon a hill and its dry climate would, it was hoped, be unfavourable to the epidemic, and considering that Hyderabad had a population of nearly 55,000 in 1891 and was now packed with Karachi fugitives, and probably contained not less than 65,000 people, the expectation was not disappointed. The first local cases had been removed to hospital. The inmates of the infected houses were all carefully segregated in a camp outside the town. The inmates of houses surrounding the infected house for a considerable area were removed. The value of this last measure was proved by the great quantity of dead rats afterwards discovered in the shops and houses opened for cleaning. Had the inmates been sleeping in these rat-infected rooms, the mortality would in all probability have been severe, whereas as inmates of the camps they altogether escaped. For four weeks Mr. Dodgson, assisted by the Military officers and his Civil staff, by the Sessions Judge, Mr. Knight, I.C.S., and by a strong body of volunteers, among whom was Mr. Hesketh, Principal of the Sind College, fought the plague and kept the weekly mortality almost level. Mr. Dayaram Gidumal, the Judge of Shikarpur, in Hyderabad, also lent valued assistance. He established a private hospital on the Native Library premises, and entrusted it to the superintendence of the Revd. A. Canney, of the Church Missionary Society, and Miss Pigott, Zenana Mission. By his request also Surgeon-Lieutenant-Colonel Henderson took a general medical supervision. A Committee of leading Native gentlemen supplied all that was needed, and the percentage of cured, 41·71, testifies to the devotion of the staff. This was about the percentage reached by the Karachi and Sukkur Government hospitals. This private hospital was opened on the 19th March, and on the 24th idem the Government High School buildings were opened as a General Plague Hospital under Surgeon Lieutenant-Colonel Henderson, assisted by nurses obtained from Calcutta. Both hospitals were closed on June 15th.

Still the disease spread. Persons feeling the dreaded symptoms would hope to escape by fleeing to another portion of the town, till they got over the dread of hospitals and sought asylum there. Rats also tried to leave infected houses, but were in large numbers exterminated by the pestilence. Clothes and bedding, spite of all precautions, would be smuggled away. As one woman said when questioned as to the clothes of a child that had died, "Oh no, they were not in the house. They had been given to the poor." Or a banya, whose little shop, where a death had occurred, was being emptied, watching

Situation,
climate and
population.

Evacuation.

Hospitals.

Spread of the
disease.

articles being listed and then burnt in the street, when it came to the bag of grain protested. The Superintendent explained how it had come in close contact with infection. "Well," said the banya, "don't burn grain; at least, give it to the poor." Close supervision had also to be kept over the disinfecting coolies to prevent the appropriation of infected articles ordered to be burnt by the Superintendents. These remarks exhibit how little the idea of contagion has penetrated the native mind.

Further increase
of the plague at
Hyderabad.

Plague Com-
mittee.

Camps.

Good effect of
the exodus of
the healthy
population.

End of the
epidemic at
Hyderabad.

Returning
population.

With the week ending the 9th April, plague broke through the barriers. Cases trebled and mortality doubled. The over-strain proved too much for Mr. Dodgson's health, and most reluctantly he had to take furlough. Mr. Gloster was sent up from Karachi, and Mr. Steele, the Deputy Commissioner of Thar and Parkar, who was to succeed Mr. Dodgson, spent a few days in Karachi, learning the plan of campaign. Mr. Dodgson's last act was to recommend a Plague Committee, and this was constituted by Government on the 9th April, with the Collector as Chairman, and Surgeon-Lieutenant-Colonel Henderson, Major Price, Commanding the Station, Surgeon-Captain Cater Jones, A.M.S., and Mr. Hiranand Khemsing, President of the Municipality, as members. The Committee did admirable work, and, as in Karachi, it minimised correspondence and promoted united, well considered effort. The camps were brought under the control of European soldiers and non-commissioned officers. These camps had been carefully laid out and very systematically worked by Surgeon-Captain Cater Jones, who devoted himself to the efficiency of their management and the comfort of the inmates. Tickets showed the occupants of each hut, with full particulars, so as to avoid constant reference by the inspecting officer to the registers which were kept in the camp of office. The observation shed for any sickness, disinfectants, provision arrangements, were all well ordered. With the increase in attacks the population recommenced flight from Hyderabad, but, with the minute precautions taken to watch every outlet, the sick scarcely attempted to get away, and, as Mr. Steele writes, the exodus of the healthy here as everywhere contributed to that abatement of the epidemic which began from the middle of April and rapidly continued till plague disappeared. The last case occurred on the 2nd June, the very day that the last case occurred in Sukkur.

With the abatement, the tactics of the Committee were reversed. This was ever the case with plague. Scarcely were dispositions made than modification was called for to meet some new development. A returning instead of a departing population had to be dealt

with. Till the house had been certified fit for re-occupation by the Superintendent of the quarter, no family could be allowed to enter, and morning by morning inspections were made to see that there was no unauthorised dweller and no sickness among the permitted residents. Nor would the Superintendent allow entry till the family was certified to be disinfected. Some 23,000 persons passed through the disinfecting depôts, where the arrangements for women and children were very complete. To all this minute care and to the great heat prevailing must be attributed the fact that plague did not anywhere re-appear, and the Committee were able with fair rapidity to reduce the establishments. The personal fatigue to all the officers in supervising their quarters was very great, but fatigue and heat and unpleasant surroundings were cheerfully borne.

Meanwhile the villages were being overhauled lest plague were anywhere smouldering. Mr. J. C. Pringle, I.C.S., a young officer, who had distinguished himself in the city, was placed on this duty. He was very careful in his investigations, but so good was the net round Hyderabad that, as already said, few sick found their way out, while the healthy were not kept in, with the result that the Hyderabad District, excluding Hyderabad itself and Tando Alahayar, where 18 cases occurred, escaped with only 37 plague cases among a population of between eight and nine hundred thousand people. Villages round Hyderabad.

Two visits were paid to Shikarpur and three to Sukkur during April and May. The work was being done well, and there was little to do but be thankful that so fine a body of officers had been provided, animated with the one mind to clear plague from the province and suspicion from the people. At Sukkur, as elsewhere, the sick were accommodated in some of the best buildings in the town, the schools having been placed freely at disposal by the Educational Inspector, and the best comforts and nourishment that could be procured were provided, while the nursing was that of the motherly Sisters of the Lady Aitchison Hospital, Lahore, generously spared and eager for the service assisted by the Zenana Mission ladies. While the sick were thus accommodated, usually in the centre of the towns, instead of being banished to some dreaded lazaretto, it was remarkable that the Plague Hospital attendants and guards, and even the relatives of the sick, enjoyed almost complete immunity. One of these nurses, Miss Horne, in Karachi, besides Sister Isabel at Rohri, took the disease, but she also recovered. Under proper management, the disease seemed paralysed and innocuous. Hospitals at Sukkur. Nursing.

Not a single European worker took the disease, and the only instance of a pure European taking plague was a little daughter of Immunity of Europeans.

a Sergeant living at healthy and sea-blown Manora, and that case was accounted for by the cook having plague in the compound and the child running about barefooted. The police and native soldiers probably owed much of their safety to their boots.

Description of
the Sukkur
camps.

The camps were, of course, unpleasant in that heat of Upper Sind which to be in any way realised must be felt. The huts were, however, as substantial protection as could be got. Mr. Gwyther and Mr. Rickie, of the North-Western Railway, and later on Mr. Strong, did prodigies of rapid work. It suggested itself to them to utilise sleepers, and huts made by sinking sleepers in the ground, and across these uprights placing a roof of sleepers covered with mud, were multiplied by the hundred at little expense. Water was laid on to the camps, and paved and enclosed bathing places provided. Shops moved themselves bodily in, and with a few screens for the better classes life was bearable.

Good effects of
removing the
population to
health camps.

Of the results of some of these camps, one, or two instances may be quoted, as they illustrate the way plague was summarily checked in many quarters all over Sind.

Gharibabad was the worst infected corner of New Sukkur, accounting for 106 cases of plague in the three weeks ending the 19th April. On the 15th there had been 6 cases, on the 16th 6 cases, but on the 17th Mr. Lucas encircled them with a cordon of men of the Wiltshires and quickly removed the entire population of nearly 600 to the health camps, where next day all were disinfected. Not another case occurred. The camp inhabitants were free to go about their business as usual, but most worked at their trades in the camp. There was individual medical inspection twice daily.

Limji Charhi was another plague-infected quarter of small size, but giving 4 or 5 cases daily among only some 300 people. On the 26th April they were similarly moved and disinfected. The plague disappeared from that day.

Disinfection of
evacuated
localities.

The inhabitants of these camps were detained for 30 days to permit Mr. Cadell, who commanded the disinfecting gangs, to finish the work of house-cleaning, so that when the population returned not a nook or corner had escaped the perchloride of mercury, and not a rag or rubbish heap remained, while walls inside and out shone with limewash, with which disinfectant had been mixed, and light and air penetrated to the darkest recesses through holes in walls and roofs. Both in Karachi and Sukkur Mr. Cadell's work was most thorough and systematised, his subordinates being carefully trained by himself. Amid the great heat, he spent the whole day in the

solitude of the empty quarter with his gangs of men, toiling to cast out the dirt of years. The result was that there was no re-appearance of plague when the streets were again tenanted by a living multitude. As at Hyderabad, the return was most carefully watched, and the new comers were all taken to the camps to be disinfected and observed. This detention was necessary because so many deaths had occurred in the villages.

Mr. Lucas' hands had been strengthened by a strong contingent of officers. Plague had to be kept out of Shikarpur, and should it get a footing there, it was desired to have officers ready to put into the town, and plague had to be beaten back, if that might be possible from the Punjab frontier. The frontier station is Reti. At Dharki, the next station south and only some 15 miles from the boundary, a sudden and sharp outbreak occurred—34 cases and 24 deaths in all. Surgeon-Major Baker and Mr. Mountford, I.C.S., the Assistant Collector in charge of the taluka, were on the spot immediately. Some good work had already been done by the local authorities, and the people had segregated themselves under trees. A disinfecting gang was organised, all the inhabitants removed, the houses systematically cleaned, the people replaced, and the public health restored. Mr. Pringle had been moved up from Hyderabad, and was again selected for the duty of clearing plague out of the villages in the Sukkur Taluka. Mr. Lucas had done a great deal of preliminary enforcement of orders by special Plague Inspectors. Mr. Pringle, after visiting every village, was able to confirm the intelligence that plague was in May confined to two villages in the Sukkur Taluka and had never been local in more than three or four. These two villages gave some trouble, but yielded eventually to the effective method of turning out the population, and disinfecting and cleaning the houses, and after the re-occupation there were no more cases. This reads easy, but May in Upper Sind represents the worth of the workers who stayed not to rest till their task was done. The result of the Gharibabad exodus was widely known, and the villagers quietly accepted the same remedy.

Outbreak at
Dharki in
Shikarpur
District.

Villages in the
Sukkur Taluka.

On the opposite bank, Mr. Mountford, I.C.S., was in charge of Plague at Rohri. the Rohri Sub-division, and defended the bridge and watched the river with determination; but the Sukkur fugitives in their sudden flight had slipped across and infected several villages within 2 or 3 miles of Rohri. Cases were occurring towards the end of March, and by the middle of April the left bank, including Rohri, was badly infected. Mr. Mountford was reinforced by Lieutenants Leith, Hislop and Bailey,

who were unsparing in their movements, and with the aid of Hospital Assistants the sick were treated in sheds under trees and made as comfortable as possible.

**Arrangements at
Rohri.**

Mr. Mountford's arrangements in Rohri were admirable. He held the disease thoroughly well in check all the time, and the bulk of the population remained, so that the town at no time looked empty. Mr. Mountford went on the plan of emptying thoroughly particular streets. He always got good information of sickness, and carried the sensible part of the townsfolk with him, and his administration was thoroughly successful.

Shikarpur.

All these weeks, Surgeon-Captain Milne, now helped by Surgeon-Captain Clark, was both defending Shikarpur and preparing for outbreak. The inhabitants got two excellent plague hospitals fully equipped, one for Hindus and one for Muhammadans, and spent a good deal of money in providing the necessary quarters for nurses and attendants and renovating the buildings selected. The Government Plague Hospital was also in readiness and received the few imported cases. Large camps were standing to receive the population of the area to be immediately vacated wherever plague might make its attack. The railway and road approaches were rigorously guarded, and every new comer found himself in the observation camp. Even if ingenuity had aided his reaching a house, concealment did not last long. The people were thoroughly determined that no plague should enter, if they could help it, and some one or other always conveyed a hint to Dr. Milne, and the travellers and the shelterers were soon in the huts. The examination of every dead body was another strong deterrent to any person taking a sick relative to Shikarpur. The Deputy Commissioner of Jacobabad tells a story of a plague child being conveyed into his town in a carpet bag. But such incidents were rare. As a rule, after the first scare, people presented themselves at hospital, or were brought by friends, or gave intimation, and the danger of the disease spreading became every day less as the towns and villages set themselves against admitting strangers, and the desire to run away with the sick gave way to the feeling that they could nowhere be better cared for than in the hospitals, Government and private.

**Disinfection of
the baggage of
railway travellers.**

By the aid of Messrs. Rickie and Strong, of the North-Western Railway, large steam disinfectors were erected at Shikarpur and Sukkur, and a smaller one at Rohri. To these disinfectors, bathing sheds were attached. A trainload of passengers was turned out, all their effects passed into the steam chamber, while the passengers

bathed in disinfectant tubs, and so the passengers were passed on to the Punjab and to Baluchistan. Surgeon-Captain Milne turned his steam disinfector to the useful purpose of making all the washermen in the town carry their bundles to it, when the soiled wearing apparel of the whole town was thus thoroughly steamed. Whatever he did, Surgeon-Captain Milne did methodically and with the keenest eye to any weak spot in his defence; but, as he says himself, the safety of Shikarpur is primarily due to the attitude of the people led by the Judges, Messrs. Dayaram and Tyabji, and seconded by the City Magistrate, Rao Bahadur Choithram, Ali Baksh Muhammad Husein, Mr. Chainrai Kalro, of the Charitable Dispensary, Lady Doctor Nash, of the Lady Dufferin Hospital, and Mr. Mathieson, Engineer and Secretary of the Municipality. No crafty cunning was set to work to defeat the measures taken. On the contrary, any attempt was exposed. Sukkur was a terrible object lesson of what concealment of plague led to, and the attitude of the people from first to last was exemplary, nor could they have been better served than by Surgeon-Captains Milne and Clark.

The Thar and Parkar and Upper Sind Frontier Districts escaped with 3 and 4 cases of plague respectively. The Deputy Commissioners very early took precautions, and persons seeking to hide a sick relative found no welcome. Mr. Mules' arrangements at Jacobabad were very thorough, and he was among the first to depend upon an observation camp as a deterrent. It would be impossible to mention all the Deputy Collectors and Mukhtyarkars who, throughout their charges, with the co-operation of the people, cleaned and whitewashed the villages till officers on duty have once and again been so struck that, from remote corners of Sind, they have reported the thoroughness of the cleansing undertaken. Conspicuous, however, as much exposed to danger, was the town of Larkana on the railway line and rushed at by the Sukkur fugitives. The Deputy Collector, Khan Bahadur Sadik Ali, and the Mukhtyarkar, Rao Saheb Jagatrai, carried out the instructions with intelligent thoroughness, and after a long period of anxiety brought the town safely through (though there were 20 imported cases). In the rest of this Deputy Collector's charge only one imported case occurred.

The extent of the plague in the province of Sind is exhibited in the table below. There were 6,063 cases and 4,779 deaths. The population of the province was returned in 1891 as 2,871,774. During the cholera epidemic of 1892, the three districts of Karachi, Hyderabad and Shikarpur lost 14,659 persons by cholera. Of the number attacked by plague, nearly 79 per cent. succumbed.

Thar and Parkar
and Upper Sind
Frontier Dis-
tricts.

General statistics.

Total plague cases and deaths in the province of Sind.

Locality.	IMPORTED		INDIGENOUS		TOTAL		Percentages of deaths to cases.
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
Karachi city ... ..	...	...	4,181	3,398	4,181	3,398	81.27
<i>Karachi District.</i>							
Tatta	32	21	21	20	53	41	77.36
Jungshahi	18	9	10	8	28	17	60.71
Kotri	27	17	17	8	44	25	56.82
Other places	108	90	5	5	113	95	84.07
Total Karachi District ...	185	137	53	41	238	178	74.79
Total Karachi District, including the City of Karachi.	185	137	4,234	3,439	4,419	3,576	80.92
<i>Hyderabad District.</i>							
Hyderabad	42	38	544	413	586	451	76.96
Tando Alahyar	5	4	13	11	18	15	83.33
Other places	37	33	...	...	37	33	89.19
Total Hyderabad District ...	84	75	557	424	641	499	77.85
<i>Shikarpur District.</i>							
Shikarpur	27	18	5	3	32	21	65.63
Sukkur ... ..	...	...	537	391	537	391	72.81
Abad, Taluka Sukkur	6	3	39	29	45	32	71.11
Rohri	32	16	119	72	151	88	58.28
Thati, Taluka Rohri	3	3	47	33	50	36	72.00
Miani Baghat, Taluka Rohri ...	...	...	26	15	26	15	57.69
Tando Mir Muhammad Hasan, Taluka Rohri.	4	1	16	15	20	16	80.00
Larkana	20	14	...	...	20	14	70.00
Khairpur Dahirki, Taluka Ubauro ...	...	...	34	24	34	24	70.59
Other places	47	41	34	21	81	62	76.54
Total Shikarpur District ...	139	96	857	603	996	699	70.18
Thar and Parkar District ...	3	2	...	...	3	2	66.67
Upper Sind Frontier	3	2	1	1	4	3	75.00
Total for the whole Province of Sind ...	414	312	5,649	4,467	6,063	4,779	78.82

The weekly total of cases and deaths, imported and local, in each district and in the chief towns and villages attacked will be found in the appended table, marked A.*

With the exception of a few imported deaths, the Khairpur State ^{Khairpur State} remained clear of plague, which was most creditable to the precautions taken by His Highness the Mir's administration. His Highness also considerately offered the services of his Assistant Surgeon when he heard doctors were required in Karachi, but being the only medical officer, it was thought better that the Assistant Surgeon should remain where he was in case his services became necessary in the State.

As already stated, the last plague cases in Hyderabad and Sukkur occurred on the 2nd of June. The town of Rohri and the whole district of Shikarpur were free of plague by the week ending the 25th June, though one death took place in hospital on the 30th June. The Hyderabad hospitals were closed on the 15th, and the Sukkur and Rohri hospitals on the 30th June. Plague lingered fitfully in Karachi till the 27th July, when it finally ceased, and the last case was discharged from hospital on the 6th August. In accordance with the terms of the Venice Sanitary Convention of 1897, 10 days must elapse from death or discharge of the last case. By Notification No. 4039, dated 17th August 1897, the City, Cantonment and Harbour of Karachi and the whole province of Sind were declared free from infection by plague, and on the 5th September there were thanks giving services in the churches of all denominations at Karachi. ^{End of the epidemic in Sind.}

The approximate expenditure incurred in connection with the plague is detailed, so far as is at present possible, in Appendix C. ^{Expenditure.} The total amounts to about six lakhs of rupees, of which more than half was spent on the Karachi District, one lakh in the Hyderabad District, and one and three-quarter lakhs in the Shikarpur District.

The pleasing task remains of endeavouring to acknowledge the services of the officers through whose instrumentality, under Divine blessing, the plague disappeared after being epidemic during a little more than seven months. ^{Services of Officers.}

During the plague, no officer rendered more valuable and conspicuous service than Mr. Robert Giles, the Collector of Karachi. To him first the thanks of the Acting Commissioner are pre-eminently due for experienced, unreserved advice, well considered suggestions, and the ability and determination with which he prosecuted to a successful issue whatever he undertook. On him fell chiefly the heavy burden of controlling plague operations in Karachi, and whatever success is due to those measures largely belongs to him.

To General T. A. Cooke, Commanding Sind District, the Acting Commissioner would respectfully offer hearty thanks for the appreciative way in which the General has spoken of all the officers serving under him. From the day he took charge, the General and the Plague Committee were most active, first in house-searching and then in turning out people from badly infected quarters and providing new accommodation. Not only places in Karachi, but every place within reach to which temporary colonies had migrated and where plague appeared was visited and thoroughly dealt with. The camps were concentrated and placed under European supervision and military guards. The disinfection arrangements for the clothing were most successful, and the arrangements at the port for the disinfection and detention, where necessary, of arrivals are admirable. The General used the Military—officers and men—freely, and the advent of this large establishment, controlled in every detail and all working together, had an almost immediate effect in diminishing the number of cases.

With General Cooke must be mentioned Surgeon-Captain Arnim and Mr. Strachan, C.I.E. The former, before the formation of the Plague Committee, has already been mentioned for the help he rendered in cleaning and disinfecting and in taking charge of quarters, and thereafter General Cooke and Mr. Giles testify to the valuable aid received. The latter was the executive officer of the Municipality to whom every one turned, and he met all demands with promptness and temper. The water-supply and the public buildings of Karachi will long remain a record to Mr. Strachan's exceptional ability and his work during the plague added to his reputation.

Mr. Tahliram Khemchand, the President of the Karachi Municipality, greatly assisted in explaining the necessity of the plague measures to the people, and to him the thanks of the Acting Commissioner are specially owing for loyal support. As the Collector states, Mr. Tahliram set an example of personal courage and loyalty to the measures that alone would have made him conspicuous, but he was also valuable for his constant presence in the city and in bringing the full resources of the Municipality to the aid of the Superintendents.

Dr. Kaka, the Municipal Health Officer, was extremely active in visiting the houses of all plague cases reported and seeing that the prescribed measures were taken, and to him is due the credit of procuring daily a fairly accurate return of the cases and deaths occurring during the preceding 24 hours—a return that soon was worked up to a high degree of accuracy.

In this work, Mr. C. McIver assisted by his supervision of the burial and burning grounds and by the readiness with which he lent his police to aid all operations. For this and for the cordiality with which he personally undertook any duty, the Acting Commissioner would offer Mr. McIver his thanks. There was no panic among the Karachi Police, and Assistant Superintendent Rook and the Inspectors and European Constables all did good service. The Collector specially mentions Inspectors Nedou, Jashanmal, Khushaldas and Samson, and Chief Constables Rahimdad and Pir Muhammad, and Constables Mathieson and Miles.

As assisting the Plague Committee, the General prominently mentions Major Bayly, D.S.O., Assistant Adjutant-General, Superintendent of the Sadar Bazaar and Cantonments, and Captain Mennie, 30th Bombay Infantry, their indefatigable Honorary Secretary.

And now follows the long roll of that fine body of officers, the Superintendents of quarters, on whose shoulders rested everything, in whose hands all authority was concentrated, and who each and all worked with tact, energy and patience the whole day long, week after week, month after month, with the same painstaking attention to detail, the same gentle compulsion and persuasive decision, first turning people out of their houses and then putting the people safely back into their houses, till at length they were rewarded by success and the confidence of the people.

Mr. P. R. Cadell, I.C.S., both in Karachi and afterwards at Sukkur, did splendid work, the worst quarters in each falling to his share. His cleaning of Gharibabad in Sukkur was a fine bit of work under trying heat.

Messrs. Gloster and Lawrence did excellent work in the worst infected quarters from the beginning, and were conspicuous for the method as their arrangements and the authoritative weight that they lent to the Superintendents generally. To the work of these three officers must be attributed that change in the attitude of the people which prepared the way for medical treatment. They were seconded in the city by the Secretary to the Port Trust, Mr. R. H. Cumming, and by the Abkari Inspector, Mr. G. J. Barker, who each had an independent charge. Mr. Crouch, the Public Prosecutor, voluntarily undertook a distant charge, and visited it daily, while Major Morris was indefatigable at Keamari. Later on, Mr. Doig, the Chief Engineer, Lieutenant-Colonel Mayne, 30th Bombay Infantry, Mr. Forrest Brunton, Manager of the Tramways, Lieutenants Anderson, 30th Bombay Infantry, Law, 1st Wiltshire Regiment, Rambaut, R.A., and Dalby, 1st Wiltshire Regiment, did excellent service.

In the Trans-Lyari extensive and troublesome district, Sardar Khan Bahadur Muhammad Yakub was in responsible charge, and his remarkable success is one of the most gratifying episodes in the history of the plague, and this distinguished officer has again earned the thanks of Government. Under him, Khan Saheb Rasul Baksh worked with energy and tact, as did the Muhammadan doctors, Assistant Surgeon Subhan Ali, and especially Hospital Assistant Sheikh Abdul Rahman and Mr. Fazul Ahmed.

The work of the Civil Surgeons, Surgeon-Lieutenant-Colonels Henderson and McCloghry, has been noticed in the report, as also the services of Surgeon-Lieutenants Niblock, Cornwall and King. All these were in charge of Plague Hospitals. Of the untiring devotion of these medical officers to the sick, it is impossible to speak too highly.

To the nursing sisters and the nurses and the ladies who helped, the Acting Commissioner would tender his respectful thanks for their ready and devoted aid in an hour of great need and in a work of danger. They and the doctors have done a great work in demonstrating to the people the determination of Government to do all that was possible to abate the plague and all that was possible to succour the sufferers. After Sister Heriberta, Miss Horne must be mentioned, for she returned to her work in the Plague Hospital after her recovery from plague.

In charge of camps are mentioned Surgeon-Captains Bray, Rivers and Fleury, A.M.S., each of whom did thorough work, and passed the population through with attention to every detail.

The thanks of all Karachi are due to Surgeon-Captain Jenney, I.M.S., for his able and thorough arrangements under the direction of the Plague Committee to prevent, if possible, the introduction of plague into Karachi through arrivals by sea. The Observation Camp is supervised by Lieutenant Law. Upon these officers, and upon Surgeon-Lieutenants Niblock and Cornwall, who watch the town, the sickness and the mortality, very great responsibility rests. They are all careful officers and specially selected.

The train examinations at Karachi still continue as an additional precaution, and one very necessary against arrivals by land or coasting boats from Cutch. Throughout the plague, Surgeon-Lieutenants Rainier and Gwyther, I.M.S., and Surgeon-Captain Clark were deputed to the duty of medically examining the passengers by trains, and to their careful work, disagreeable as it was and at hours that kept them early and late at the Railway Stations, must be ascribed the decided check, very early given to the movement of the sick. Assistant Surgeon McMullen, at Kotri, also was useful in this work. In this work, too,

were associated the Lady Doctors, Miss Duggan and Miss Nash, and one or two nurses. And in every possible way the Lady Doctors were most helpful—in searches, in treating the very few pardah sick, and in giving confidence by their mere presence.

- The successful exertions of Mr. M. D. Mackenzie and Mr. Vaughan, I.C.S., at Tatta, when they were well aided by Diwan Shiwandas, the Vice-President of the Municipality, and of Mr. Braysor at Kotri, where Seth Lalchand, a Municipal Commissioner, maintained the camp at his own cost, have been narrated.

To Seth Vishindas of Karachi, a very special tribute is due, both for building and maintaining at his own charges a temporary hospital where all castes were welcomed, and which was well managed to the last, and also for establishing grain shops in the camps and in several parts of the city at a time when, owing to the flight of the Panias, or petty shop-keepers, grain was getting dangerously scarce. This benevolent gentleman sold the grain at cost price, and personally supervised both shops and hospital, and is entitled to the special notice of Government. The Acting Commissioner tenders to him his hearty thanks.

And also to another gentleman, Mr. Motiram Advani, is special recognition due, who in an incredibly short time produced ample funds for the Plague Relief Fund, and then rendered the signal service of expending the money in the most judicious and careful way, so that the sick and the nurses lacked nothing, and, so far as he could ascertain, the indigent and the orphan were helped.

Passing to other districts, Mr. Dodgson, I.C.S., the Collector of Hyderabad, worked with an energy and judgment that had already won the Acting Commissioner's high commendation, when the overstrain, to some extent, caused by the attitude of the upper classes who failed in the commencement to understand that plague results from the transgression of certain laws, obliged him to take furlough and leave his unfinished task.

Mr. C. E. S. Steele, who acknowledges in unqualified terms the assistance he received from Mr. Gloster, took charge of the Collectorate, and carried his heavy and extensive charge safely through the crisis, displaying qualities that won him general confidence. With him were associated Surgeon-Lieutenant-Colonel Henderson, of whom mention has been frequently made. Major Price, Commanding the Baluch Regiment, and Surgeon-Captain Cater Jones, A.M.S., Major Price rendered the full assistance of the military, and himself took charge of a part of the town. Surgeon-Captain C. Jones organised and managed the camps. Of both officers the Collector speaks highly, and also of Mr. Hiranand Khemsing, the President of the

Municipality. To Mr. Hiranand it was specially due that the plague measures were supported by the Municipality, and that the opposition already alluded to quickly subsided. These officers were assisted by Mr. Knight, I.C.S., the Judge, who took charge of a quarter, Mr. Rieu, I.C.S., who also is specially mentioned by Mr. Steele as having prepared the Hyderabad report, by Captains Fowler, Tighe and Southey, and by Lieutenant Dyke, by Mr. Divatia, by Messrs. Hesketh and Bayliss, and by Surgeon-Major Avetoom and Surgeon-Captain Jackson. Several Municipal Commissioners also helped, among whom Mr. Kauramal did specially good work. The Collector also favourably notices the work done by Diwans Manghirmal and Thawardas, Mr. Rozare, Abkari Inspector, Mr. Chuhamal, Public Prosecutor, Mr. Contractor, Head Master, Mr. Kotwal, Municipal Secretary, and Messrs. Tarachand and Poredi, Health Officers. Of the work of the Revd. A. Canney, C.M.S., and of Miss Pigott, Zenana Mission, in Mr. Dayaram's Plague Hospital notice has been taken.

In the Shikarpur District, Mr. W. H. Lucas, I.C.S., did a splendid bit of work. The Collector awards him high praise. Surgeon-Major Corkery and Mr. Ingle, the Secretary to the Municipality, both Members of the Plague Committee, of which the Collector was President, worked unsparingly. Mr. Mountford, at Rohri, conducted the operations most successfully, and with an amount of personal labour that secured to him the sympathy of the town. He was well assisted by Mr. Tiloksing Jethsing, the Municipal Secretary, of whom Mr. Mountford speaks highly. Surgeon-Lieutenant King, whose management of the Plague Hospitals has been noticed, was helped by the Sisters Seraphina, Isabel and Louisa, by Nurse Murray, and by Miss Driscoll and the other Zenana Mission ladies. Among other helpers in the operations are mentioned Mr. Bahadurji, Sub-Judge, the late Mr. Harrison, of the Indus Conservancy, a very earnest worker, Mr. Hayter, Assistant Superintendent of Police, Mr. Dracup, Mr. Rochiram, the City Magistrate, who deserves credit for taking his son to hospital and his family to the Camp, Mr. D'Abreo and Rao Bahadurs Choithram Girdhardas and Chandumal and Khan Bahadur Pir Baksh, Deputy Collectors Rao Saheb Kinatsing, Mukhtyarkar, Seths Suliman and Motandas the only two Municipal Commissioners who stayed to aid, Sanitary Inspector Marker and Hospital Assistant Benjamin. Mr. Cook, District Superintendent of Police, and Mr. Marston, Assistant Superintendent, conducted the Police duties well. Rao Bahadur Shaukiram, the Divisional Forest Officer, was very active in looking after the comfort of the camps. Lieutenant Beadon and the men

of the Wiltshire Regiment deserve special thanks, as do also Lieutenants Leith, Hislop, and Bailey.

The Acting Commissioner cannot forget the support rendered by the Principal Medical Officer, Sind District, at a time of great anxiety, and begs to thank him for it.

Mr. E. Giles, Educational Inspector, merits special thanks for the full assistance of his Department; and to Messrs. Dayaram Gidumal and M. B. Tyabji cordial acknowledgment of their voluntary service must also be conveyed.

The able and willing assistance afforded by Surgeon-Major Baker has been frequently acknowledged by the Acting Commissioner, and to Surgeon-Captain Borradaile also thanks are given for his readiness to assist.

The Acting Commissioner would also beg permission to thank Colonel Brackenbury, R. E., the Manager of the North-Western Railway, and the officers of the railway, Messrs. Tickner, Bean, Rickie, Strong, and Gwyther, for unstinted active practical help.

To Captain Finney, R.I.M., the Port Officer, the thanks of the Acting Commissioner are also due.

The Collector of Karachi speaks of much help received from K. B. Framroz, E. Panthaki, the Mukhtyarkar of Karachi, and Mr. Phillipowsky, of the Customs, was a good Supervisor.

Many names have been left out. Where all Departments united forces, it is difficult to mention everyone, and the Acting Commissioner is aware that, even where plague never appeared, Deputy Collectors and Mukhtyarkars worked hard to protect their charges.

The Acting Commissioner has endeavoured to present a picture of the whole, but with this report must be read the report of the Karachi Plague Committee, in which General Cooke describes with fuller knowledge the operations subsequent to the formation of the Plague Committee.

To the troops employed, to the Royal Artillery, to the Wiltshire Regiment, to the Baluch Regiments at Karachi and Hyderabad, to all ranks, the thanks of Government are due, not only for doing unusual work well, but for mixing among the people kindly. General Cooke set an example of personal courtesy that was followed by all. That the contact has raised the British soldiers in the estimation of the people there can be no doubt whatever.

The European population of Karachi met the approach of plague without fear or clamour, with a quite helpfulness and confidence that were of the utmost assistance in allaying panic among the natives.

To the people the Acting Commissioner would offer his thanks for the patient trustfulness with which the plague measures were tolerated, and the general submission with which inconveniences were put up with.

The co-operation of the people was the main factor in any success attending the plague measures, and the plague, though it has doubtless left many sore hearts, has left few bitter ones, and the Acting Commissioner trusts many grateful ones. It has represented the Government to the people in a new and striking attitude, sending forth its officers of all Departments to heal the sick and stand between the pestilence and the population, and the effect must be to draw the ties closer, and awaken new thoughts in the minds of the multitude.

To Mr. J. Sladen, I.C.S., Assistant Commissioner, Mr. Wingate is deeply indebted, and latterly also to Mr. H. S. Lawrence, I.C.S., for bearing with marked ability a great share of the burden of the work of the province, besides assisting in the special work caused by the plague. They were ably helped by the Assistant Commissioners, Mr. Whittle and Rao Bahadur Choithram, who worked unceasingly to get necessary work through and avoid arrears accumulating. To the Head Clerk, Mr. Cross, and to the whole office who have worked so hard, and who do credit to the training they have received in past years, the thanks of the Acting Commissioner are given, and specially to Mr. Tahilram, the Plague Clerk. Upon Mr. Quanbrough, the Superintendent of the Commissioner's Press, and his staff, devolved very heavy work, which they, like the Commissioner's Office, most cheerfully undertook.

In conclusion, the Acting Commissioner would desire to say that, if any success has been attained, it is due to the magnificent sense of duty which has inspired all officers. If this report fails to convey the admiration and thankfulness which the Acting Commissioner feels towards the very fine body of officers serving in Sind, it is the fault of his pen. He is conscious of an earnest desire as the events pass in rapid succession to name those chiefly associated with each detail of the operations.

Karachi, 21st September 1897.

No. 3. **Other papers regarding Karachi.**

**LETTER FROM THE GOVERNMENT OF INDIA, NO. 367,
DATED THE 6TH JANUARY 1897.**

I am directed to forward, for the information of His Excellency the Governor in Council, a copy of a note written by Surgeon-Major-General Cleghorn, Sanitary Commissioner with the Government of India, on his recent visit to Karachi.

2. His Excellency in Council will observe that the facts elicited by Dr. Cleghorn's investigation have led him to the conclusion that in Karachi, as in Bombay, the disease is only slightly, if at all, either contagious or infectious in the common acceptance of these terms, and that the incidence of the disease is mainly due to local causes.

3. The Government of India notice with great satisfaction the success that has been achieved by the authorities at Karachi in preparing and arranging for the sanitation of camps of huts in the open, and in securing the removal of the inhabitants of the infected quarters of the city to these camps, and they trust that these measures will help greatly in checking the disease. They are sure that the Government of Bombay will agree with them that the zealous endeavours made to bring about these ends by Mr. Wingate, the Commissioner in Sind, Mr. Giles, the Collector and Magistrate, Mr. Strahan, the Secretary to the Municipal Committee, and Dr. Kaka, the Health Officer, are deserving of great credit.

4. The Governor General in Council desires specially to commend to the consideration of the Government of Bombay the following suggestions made in Dr. Cleghorn's note:—

- (a) That Dr. Arnim, the Deputy Sanitary Commissioner now in Karachi, should be placed in medical charge of the different camps, in which Dr. Cleghorn points out that the population will require careful supervision.
- (b) That a house evacuated should not be re-occupied until its interior has been thoroughly cleansed, disinfected and whitewashed, and that these measures should be extended as widely as possible.
- (c) That permission should be refused to the re-occupation of a house or room until it is placed in a proper state for habitation.
- (d) That overcrowding in houses and rooms should be prevented.

- (e) That a Commissioned Medical Officer should inspect the railway passenger traffic at Karachi City Station, accompany the trains to the Cantonment Station and inspect passengers who may enter at that station.

5. In conclusion, I am to say that the Government of India will place more medical officers at the disposal of the Government of Bombay if His Excellency in Council considers that more officers are needed.

NOTE BY SURGEON-MAJOR-GENERAL CLEGHORN ON
KARACHI.

No. 4.

The first case of the disease was reported to, and observed by, Dr. Kaka, the Health Officer, on the 10th December. The individual attacked was a cook to a Hindu merchant, whose house was situated in the Bunder quarter of the city. He was said to have landed from Bombay on the 8th or 9th December, but the evidence on this point is certainly not clear, was attacked with fever on the latter date, and died on the 10th, with all the symptoms of plague. When the fever declared itself, the man was removed from the house in the Bunder quarter, to another in the Ranchore quarter, where he died. No other case has occurred in either of these houses.

The second observed case appeared on the 11th December in the old town quarter in the person of a broker, whose office is in the Bunder quarter in close proximity to the house in which the first case occurred, but his residence was situated in the Old Town quarter.

Beyond the above there appears to be no clear and distinct evidence of the importation of the disease into Karachi by human intercourse, but it is admitted that cases may have occurred previous to those noted, although not reported.

As in Bombay, the appearance of the disease was followed by a great mortality among rats.

The population of the City of Karachi according to the census of 1891 amounted to 98,195, one-fifth of that number may be added for natural increase, which will bring the present population up to 117,834.

The town, excluding Cantonments and Harbour, is divided into 31 quarters or wards, and up to 24th January 606 deaths have been reported from 14 of these wards; the remaining 17 have been entirely

freq. The incidence of these deaths in the fourteen wards was as follows:—

No.	Quarters.	Number of deaths.	Estimated population.
1	Ranchore	5	8,986
2	Old Town	407	11,489
3	Machi Miani	66	3,721
4	Market	49	8,107
5	Bunder	22	1,277
6	Napier	18	10,274
7	Lyari	13	27,056
8	Serai	2	4,916
9	Garden	10	7,494
10	Sadar Bazaar	1	9,087
11	Ramswamy	1	1,777
12	Rambagh	1	3,758
13	Civil Lines	1	1,394
14	Jail (the quarter so called)	10	4,565
	Total	606	...

The worst parts of the town are the quarters named Old Town, Machi Miani, Market, and Bunder, where the greatest mortality has occurred. The two former face the bed of a dry stream, extending backwards until they become contiguous with the other quarters. Many of the houses I visited in the quarters abovenamed were quite unfit for human habitation, there were no openings for the admission of air and light, the rooms were overcrowded, and the inmates lived in complete darkness. The Old Town is the worst in these respects, but the overcrowding in houses and of ground area is common to all.

Of the 59 ascertained deaths from plague which were reported up to 31st December, 49 or 83·1 per cent. occurred in the Old Town, and of the total 606 deaths, 407 or 67·1 per cent. were reported from the same quarter.

It must also be noted that many of the deaths reported from other quarters occurred in fugitives from the Old Town.

The death-rate from plague in Karachi City has, therefore, been only 0·52 per cent. of estimated population, and in the worst quarter where the greatest mortality has occurred, only 3·5 per cent. on the estimated population of that quarter. This, I think, proves that the disease, as in Bombay, can only be slightly, if at all, either contagious or infectious in the common acceptation of these terms, and the following additional facts warrant me, I think, in coming to the conclusion that the incidence of the disease is due to local conditions.

1. No death has as yet been reported from any of the houses on the exposed edge of the town, *i.e.*, on the one with a frontage to the dry bed of the stream.

2. Comparatively slight extension in the other quarters, and that only in the worst houses.

3. Lyari, a suburb, containing an estimated population of 27,000 locally said to be 30,000, situated a quarter to half a mile from the Old Town, Machi Miani and market, is in constant communication with these quarters and receiving fugitives from them: Only 13 deaths up to 24th January. The houses in this suburb are scattered over a large area, and are as a rule of small size. There are numerous gardens and open spaces in the area.

4. Khudder, a village, with a population of 2,000, chiefly fishermen, situated half a mile from the town—women of the village, proceed daily to the town to sell fish, but there were only two deaths up to 26th January. The village consists of huts, each occupied by a single family.

5. Keamari, a village near the port, with a population of 2,378. No deaths from plague.

6. No deaths reported among coolies connected with the shipping.

7. Eighty police employed in the city during the 24 hours. No deaths.

8. The immunity enjoyed by officers and subordinates of Health Department.

The houses in which a death has occurred are marked thus (+), and the mark is repeated for each death. In visiting all parts of the city with the officers of the Health Department I was struck with the localization of these marks and their absence from the better class of houses.

The measures which have been taken, and are still in progress towards arresting the spread of the disease, are cleansing and disinfection of houses in which a death has occurred, greater attention to general cleanliness and, when possible, removal of the healthy from infected houses.

On the 11th January the construction of mat huts on a large space of open ground near the town was commenced, but the people could not be induced to occupy them until the 24th, when the headmen of the Hindus living in the Old Town agreed to the exodus. On the 27th January, there were nearly 400 huts erected, which were then occupied by 2,500 to 3,000 people.

The huts are built separately and arranged along wide streets, water is laid on and all sanitary arrangements are attended to.

The Muhammadans and Kutchers have also agreed to turn out of their houses, and huts are now in course of construction for their occupation.

A population living under these conditions will require careful supervision, a Civil Officer has been detailed for the duty. I also recommend that the Deputy Sanitary Commissioner, Dr. Arnim, now in Karachi, should be placed in medical charge of the different camps.

The Bombay Government might be informed that, if further medical assistance is required, officers can be supplied on application to Government of India.

A house evacuated is not to be re-occupied until its interior has been thoroughly cleansed, disinfected and whitewashed, and these measures should be extended to the other houses in the city.

In addition to these measures it appears to me to be necessary for the future safety of the city that all houses, declared by the local medical authority to be unfit for human habitation, should be demolished, and the ground acquired by the Municipality.

That the local authorities should be authorised to refuse permission to the re-occupation of a house or room until it is placed in a proper state for habitation, and a law should be passed to prevent overcrowding in houses and rooms.

* * * * *

It is, I think, generally accepted that the limit of incubation of the plague in a human being is eight to nine days. The facts which have come to my notice support this view, and I would recommend that quarantine should be limited to ten days.

It was suggested to me when in Karachi, that as the Municipal Committee is making such great endeavours to stop the progress of the disease, their efforts might be frustrated by allowing passengers from Bombay to land immediately on arrival of the ships, and they think that a quarantine of ten days from date of departure from Bombay, when no case has occurred on board, might be imposed on all arrivals.

The cargo to be landed in the ordinary course. This appears to be appropriate and justifiable, but Mr. Wingate, the Commissioner, declines to recommend its adoption until it can be clearly proved that arrivals are followed by fresh importation of the disease.

The inward passenger traffic by rail is carefully watched by medical subordinates on the main line, and on those to Quetta and Hyderabad, but I think it advisable that a Commissioned Medical Officer should inspect at Karachi City Station and accompany the train to the cantonment station and inspect passengers who may enter at that station.

This Medical Officer would be under the orders of the Commissioner or Magistrate, and would be available for any other duty connected with the plague.

The arrangements now being made at Karachi will be watched with interest, as if the removal of a whole or portion of the inhabitants to huts proves ultimately successful, the procedure may be followed with advantage elsewhere.

* * * * *

2nd February 1897.

No. 6. **General Remarks on the disinfection of Houses.**

EXPERIMENTS MADE BY MR. HANKIN.

No. 430, dated Agra, the 15th July 1897.

From—E. H. HANKIN, Esq., Chemical Examiner and Bacteriologist,
North-Western Provinces and Oudh,

To—SURGEON-COLONEL WARBURTON, Inspector-General of Civil
Hospitals, North-Western Provinces and Oudh.

I have the honour to forward for the information of Government an account of experiments I have recently carried out in Hardwar on methods of disinfecting plague infected houses.

2. It will be convenient to preface my remarks by a short résumé of the work I have carried out in Bombay on the action of disinfectants on the microbe of bubonic plague. A full account of this work has been already communicated to the Surgeon-General with the Government of Bombay. The method employed was that that is most ordinarily used in testing the action of disinfectants on microbes. The results obtained may be tabulated as follows:—

A.—Action of the Phenols and their Allies.

The bubonic microbe was found to be somewhat resistant to the action of carbolic acid, a one per cent. solution not being always sufficient to kill it under the condition of the experiment. Phenyle, Lysol, and Izal were found in all cases to destroy the microbe when in a quarter per cent. solution. The limit of dilution of the solutions of these substances necessary to destroy the microbe was not however found. Naphthaline, both pure and impure, and a patent preparation "naphtho-sublimate" were found to exert no disinfectant action although tested in solutions containing an undissolved excess of these substances.

B.—Action of Corrosive Sublimate and Copper Sulphate on the Plague Microbe.

Sublimate was found to destroy the microbe in a strength of one in five thousand, but the lower limit of its action was not investigated. Copper sulphate was found to be efficient in a strength of one in a thousand. A five per cent. solution of this substance was used by the French Government in 1892 in combating cholera. It is easily obtainable in India, and might under certain conditions be used against the plague as shown by the above result.

C.—Action of Alkalies on the Bubonic Microbe.

This microbe appears to be relatively resistant to the action of alkalies including ammonia, caustic potash, and freshly slaked lime. Under the conditions under which lime washing must be carried out

in India, it must not be regarded as a disinfectant for the infection of bubonic plague.

D.—Action of Acids on the Microbe of Bubonic Plague.

The microbe of plague is extremely sensitive to the action of acids. Even certain organic acids were found to be capable of destroying it rapidly. The results obtained with these substances were as follows :—

It is destroyed under the conditions of my experiments within five minutes by—

Formic acid of a strength of 1 in 100.

Acetic acid of a strength of 1 in 142.

Lactic acid of a strength of 1 in 333.

In view of the fact that most articles of diet either possess an acid reaction or rapidly acquire it on the onset of decomposition owing to the appearance of the above acids or their allies, it seems scarcely probable that food-stuffs should retain for long the microbe of bubonic plague. In the case of milk this speculation has been put to an extended test by Dr. Srinivasa Rau in my laboratory in Bombay. He found that as soon as milk has been kept long enough to acquire a well marked acid reaction, that is to say, within a few hours of milking under ordinary conditions, it has the power of destroying the bubonic microbe within an hour. If on the other hand the milk is made faintly alkaline, it is incapable of so doing, and appears to be a good food medium for the bubonic microbe. Dr. Rau has also carried out experiments on the vitality of the bubonic microbe in rotten grain. This substance nearly always has an acid reaction, and is then capable of rapidly destroying the bubonic microbe. I propose to describe his experiments at length in another report. The tissues of animals after death acquire an acid reaction owing to the development of an ally of lactic acid. Dr. Rohak under my direction has found that this acid reaction appears in the bodies of animals dead of plague. This point, though it has no bearing on the admitted danger of handling and washing plague corpses, may if worked out, be found to have an important bearing on the old idea that graveyards may be a lasting source of infection.

As may be expected, inorganic acids were found to have a still more potent action on the microbe of plague. The results were as follows :—

The bubonic microbe was found to be destroyed within five minutes by—

Nitric acid in a strength of 1 in 333.

Hydrochloric acid in a strength of 1 in 500.

Sulphuric acid in a strength of 1 in 1,425.

A mixture of four parts of sulphuric acid and one part of nitric acid was found to be as efficient as sulphuric acid in destroying the plague microbe. The waste acids from the Kirkee Cordite Factory consists of sulphuric acid with a slightly less proportion of nitric, and might therefore be used in combating plague. Sulphuric acid is recommended as a disinfectant by its great cheapness.

B.—Action of Reducing Agents on the Bubonic Microbe.

The microbe was found to be extremely resistant to the action of ferrous sulphate, a substance that has been frequently recommended for the treatment of sewage and filth.

The bubonic microbe appears generally to die out when evaporated to dryness in a thin film on glass in the presence of the air. I found it still alive after five days when evaporated to dryness in glass bulbs in a current of hydrogen gas.

F.—Action of Oxidising Agents on the Microbe of Plague.

The bubonic microbe was found to be destroyed by a solution of one in ten thousand of chloride of lime, but the lower limit of the action of this substance was not detected. Permanganate of Potash was found to be capable of destroying it, under the artificial conditions of my experiments, in a dilution of 1 in 50,000, that is to say, in a solution in which the pink colour is but faintly marked. In certain cases it appeared that the organic matter present was sufficient to destroy all the permanganate used, after the lapse of some hours. In these cases the microbes were first destroyed and afterwards the permanganate was reduced. It was shown however by experiment that the quantity of readily reducible organic matter present on a cow-dung floor is so great that probably a four per cent. solution of permanganate would be necessary to produce a safe disinfection.

3. The conditions under which the above experiments were carried out were probably more favourable to the disinfectant than would be the case in practice. This fact, while tending to justify the condemnation of a disinfectant from the results of such experiments, necessitates caution in using such experiments to recommend a disinfectant. The fact that a disinfectant can destroy a microbe suspended in water, as was the case in my experiments, does not prove that it would be capable of destroying the microbe when contained in human dejecta soaked into a cowdung floor. Hence it appeared to me to be advisable to carry out some experiments in which practical conditions would be more closely imitated.

Owing to the fact that the excreta of men and rats suffering from plague are likely to fall on to the floor of houses, and that

hours later the relative number had risen to 130° as shown by the first line in the table.

Disinfectant.	Before treatment.	After 1 hour.	After 2 hours.	After 3 hours.	After 24 hours.
A. Sublimate 1 in 1,000 ...	100	60	55	40	130
B. Sublimate 1 in 1,000 plus Hydrochloric acid 2 in 1,000 ...	100	0	43	0	0.1
C. Chloride of lime 1 per cent. ...	100	0	112	63	315
D. Potassium permanganate 1 per cent. ...	100	98	55	76	86
E. Sulphuric acid 1 per cent. ...	100	0	79	57	35
F. Permanganate and Sulphuric acid each 1 per cent. ...	100	17	12	11	7
G. The same mixture diluted ten times ...	100	31	49	131	112
H. Sulphuric acid 1 in 250 ...	100	87	63	45	112
I. Sulphuric acid 1 in 500 ...	100	91	140	142	300
J. Sulphuric acid 1 in 500 plus permanganate 1 in 1,000 ...	100	68	72	63	161
K. Phenyle 1 per cent. ...	100	0	248	166	138
L. Lysol 1 per cent. ...	100	0	72	67	220

After addition of the disinfectants the treated areas were protected from dust by means of covers placed over them. It will be noted that the only substance tried that produced anything approaching a complete disinfection was corrosive sublimate in an acidulated solution. Chloride of lime, phenyle, and lysol appear to be without much action on the microbes of a cow-dung floor, although as is known they are energetic disinfectants of microbes suspended in test tubes of bouillon. A comparison of experiments D, E, and F, shows that a mixture of permanganate and sulphuric acid acts more strongly than either of these substances alone. The same deduction can be drawn from experiments I. and J. As already explained, moistening a cow-dung floor is likely to lead to an increase of the number of colonies that will appear in these experiments. The specimens taken before treatment were obtained from the floor while it was dry. Those taken after treatment were taken when it had for some time been moistened with the disinfectant solution. This is the most probable cause of the increase in the number of colonies developed after addition of the solution of phenyle in experiment K.

The following observations were made in houses in course of disinfection in Hardwar and in the neighbouring village, Kankhal.

The first case investigated was in a large two-storied pucca built house near Hurki-Pairi Ghat in Hardwar. This house had been

evacuated about two weeks before my visit, and the inhabitants had cleaned it up and had most of the rooms whitewashed. On the first floor I found a small room that the coolies had not thought noticeable enough to whitewash. One or two of them appear to have used it as a latrine. This is referred to below as room A. The small numbers of microbes or rather colonies met with before disinfection is probably due to the room being pucca built and thoroughly dried. This room was treated with a neutral solution of sublimate of a strength of 1 in 1,000. Room B was a badly smelling place on the ground floor. It had not been previously cleaned. It was treated with sulphuric acid of a strength of 1 in 250 with about half the quantity of permanganate. The specimens were taken about a quarter of an hour and again 24 hours after disinfection. The following are the results :—

Locality.				Number of colonies in specimen taken.		
				Before.	$\frac{1}{2}$ hour after.	24 hours after.
1.	Dirt from floor of room A	...		2,980	5	11
2.	Do. do.	...		960	6	19
3.	Do. do.	...		1,280	256	1,440
4.	Do. do.	...		640	0	30
5.	Dirt from floor of room B.	...		1,100	44	117
6.	Do. do.	...		2,000	24	35
7.	Do. do.	...		0	171	29
8.	Do. do.	...		0	25	340
9.	Dirt from wall of room B.	...		400	1	34
10.	Do. do.	...		0	88	1,280
11.	Cow-dung floor of cook-room...			1,200	0	544
12.	Do. do.	...		0	0	640
13.	Do. do.	...		0	0	12,000
14.	Do. do.	...		0	0	768

The cook-room had been previously whitewashed. On the day of my visit it was treated with sublimate solution.

Other observations were carried out in Kankhal, a village near Hardwar. No local cases of plague had occurred here, but some rats had been dying of plague in the house of one of the leading inhabitants. This was a large pucca-built ill-ventilated and dirty house. A large quantity of grain was stored in one of the rooms on the ground floor. The owner told me that the doors of the rooms had to be kept shut owing to the depredations of monkeys. The upper stories of the house seemed in great part to be given up to the use of these animals. Acidulated sublimated solution was used to disinfect this house, and I noticed that the disagreeable smell of dirt was still present in each room after the disinfection had been carried out.

The following results were obtained :—

Locality.	Number of Colonies developed in specimens taken.	
	Before disinfection.	Quarter hour after disinfection.
1. Brick Courtyard	9,600	208
2. Do. do.	28,000	1,100
3. Outer-room South side, cutcha floor ...	1,800	1,100
4. Do. do do.	2,500	78
5. Cutcha stable floor, outside granary ...	25,000	120
6. Do. do. do.	35,000	43
7. Pucca living room	1,900	128
8. Do. do.	3,560	192
9. Cook-room	0	352

In drawing conclusions from the above results it must be borne in mind that the action of acidulated sublimate solution only reaches its maximum after two hours, as shown by earlier experiments, and that the specimens in the above experiment were taken only fifteen minutes after the application of the disinfectant.

Recent work has shown that sulphur fumigation cannot be relied upon to destroy microbes. Experiments carried out by the German Health Officer have shown that though gaseous disinfectants may destroy the microbe in experiments on a small scale, they will not do so in large rooms as the gases do not show sufficient penetrative power. I carried out the two following experiments to further test the matter.

In the first experiment a small godown in the Collector's bungalow in Hardwar was treated. The room was closed up as well as was practicable. The men employed to fumigate with sulphur in Hardwar were called in and told to treat the room with sulphur as was customary. They first brought in an "ungete" containing a bright coal fire. On this they put a "degchie" of water to produce steam. Then another "ungete" with a fire was brought in. On this they threw a handful of flour of sulphur, which, owing to the strength of the fire, was almost immediately consumed. Then one of them rushed into the room and threw a small quantity of methylated spirit on to the fire containing the sulphur. Owing to the presence of two brisk fires in the room, the greater part of the contained oxygen is likely to have been changed into carbonic monoxide and dioxide, so that only a fraction of the oxygen would have had a chance of combining with sulphur had enough of the latter substance been present. Naturally under such conditions no disinfection took place. Specimens of dirt taken before fumigation produced from 1,800 to 3,200 colonies. Specimens taken from the same positions after fumigation produced from 2,400 to 5,000 colonies. Some

agaragar plague cultures were placed in different parts of the room, and after fumigation were inoculated on to fresh agaragar. In all cases a typical growth was produced.

The second experiment was carried out in a bathroom in the same bungalow. Before fumigation water was thrown over the walls and ceiling of the room, so that plenty of aqueous vapour should be present in the air. The sulphur was burnt in the following manner. About two seers of flour of sulphur were placed in each of two earthenware pans. Enough methylated spirit was added to make the powdered sulphur stick together, so that it could be moulded into a thick column. The columns were then lighted and the doors closed. The sulphur burnt for a long time, and a yellowish fog gradually developed in the air in the room. The following results were obtained :—

			Before fumigation.	After fumigation.
Dirt off floor	...	...	370,000	1,700
Ditto	...	...	14,400	6,000
Ditto	...	...	0	4,800
Ditto	...	...	0	400

The above results show that an incomplete disinfection had occurred. As in the previous experiment, agaragar plague cultures were placed in different parts of the room before the fumigation. After fumigation each culture was inoculated on to fresh agar and in each case it grew. In two of the tubes, however, the colonies were not very numerous, suggesting the possibility that some slight effect had been produced on the microbes present. It may be objected to this part of the experiment that the bubonic microbes were present in test tubes closed in each case by a plug of cotton wool, and that thus they were to some extent protected from the action of the gas. It is impossible, however, to conceive that a plug of cotton wool can greatly hinder the diffusion of a gas. In practice the sulphurous acid gas would have to penetrate far more serious obstacles than loose cotton wool if it is to be of any use at all. Another condition was in favour of the sulphur, that might not always exist in practice, namely, that the bubonic microbes exposed to its action were moist. Sulphur when burnt produces sulphur dioxide. This is only disinfectant when it has combined with water forming sulphurous acid. Hence microbes in a damp condition are more likely to be affected than if they are dry.

There remains another way of treating an infected floor which where practicable is likely to give better results than can be obtained with a chemical disinfectant, namely, by exposing it to the action of fire. The following experiment was carried out to test this possibility.

An area of earth, about ten feet square, under the shade of a tree, was covered with a mixture of mud and cowdung. The smooth surface thus produced was allowed to dry during four days. Then a small portion of the surface was again covered with fresh cowdung and mud. The whole was then covered with a layer of dry grass about two inches thick. In addition bamboos about an inch thick were laid side by side at about half an inch distance from each other, over about half the area. The grass was then set alight, and after the fire had gone out the surface was tested with the following results:—

	Before burning.	After burning.
(1) Surface afterwards covered with a thick layer of grass ...	1,600	1
(2) Surface afterwards covered with a thick layer of grass ...	1,080	0
(3) Surface covered with a thin layer of grass ...	0	400
(4) Half an inch below the part of the surface covered with a thick layer of grass ...	3,200	22
(5) Half an inch below the part of the surface covered with a thick layer of grass ...	2,000	100
(6) Two inches below above surface.	0	900
(7) Freshly covered surface afterwards covered with grass and bamboos.	7,300	0
(8) Fresh covered surface afterwards covered with grass and bamboos.	2,400	0
(9) Half an inch below this surface.	0	0
(10) Ditto ditto	0	2
(11) Two inches below above surface	0	48

Thus in the above experiment, complete disinfection appears to have been produced by the burning of a layer of grass two inches thick. Where the heat was greater owing to the combustion of the bamboos, the disinfectant action appears to have reached to some distance below the surface. Although probably the quickest and most certain method of freeing an earthen floor from infection, the method of firing must be for obvious reasons limited in its applicability. It was tried with apparent success in an infected chawl in Bombay inhabited by the families of policemen. Grass as in my experiment was burnt all over the floors and no more cases of plague occurred. Though the method can thus be carried out with the help of intelligent supervision, it would probably lead to accidents if employed in a town on a large scale. In most cases, however, it can be used in public latrines, which are frequently made of corrugated iron or other incombustible material. Both on the

general grounds that human excreta are apt to contain the microbe of the disease, and on the *a posteriori* evidence of the Hong-kong epidemic, it is probable that public latrines may become sources of infection, and consequently are greatly in need of efficient disinfection. Owing to the existence of caste and other prejudices the disinfectant of public latrines is very often shirked. Further, if ordinary disinfections are used, it is not easy for an inspecting officer to know whether the work has been properly carried out. Hence I suggest that public latrines in infected areas should be frequently treated with burning grass or other fuel. The sweeper could put a bundle of grass on to each compartment and light it. Afterwards the ashes could be washed out with a dilute solution of sulphuric acid.

The probable efficiency of disinfectants is not the only factor to be taken into consideration. Their cost must also be noted. Taking commercial prices, the cost of various possible disinfectants is as follows :—

	Number of gallons of the solution obtainable for one rupee
(1) Sublimate 1 in 1,000	15
(2) Sublimate 1 in 1,000 plus hydrochloric acid 2 in 1,000	14
(3) Sulphuric acid 1 in 250	1,920
(4) Sulphuric acid 1 in 250 plus 1 in 500 of per- manganate of potassium	128
(5) Phenyle 1 in 100	144

The above prices do not include cost of transit which is higher for sulphuric acid than for permanganate or sublimate.

Another question that must be taken into consideration in choosing a disinfectant is whether its action is likely to be lasting, whether in other words its employment is likely to make the medium unsuited for a considerable time for the life of the bubonic microbe. This is possibly more important in the case of bubonic plague than with other diseases. Not only in this disease is a disinfected area liable to be reinfected by human patients, but in addition in many cases this may occur through the agency of infected rats. Hence a disinfectant that merely destroys the microbes present at the time, and that has no lasting action is not sufficient for the purpose. As shown by previous experiments, acidulated sublimate solution is the only one of the disinfectants tried that showed a clearly good action on a cowdung floor. Unfortunately, however, solutions of mercuric salts, even with the addition of volatile hydrochloric acid, are by no means stable, especially when mixed with the material of a cowdung floor. Dilute sulphuric acid on the other hand is not volatile, and if used in sufficient

quantities is likely for some time at least to make the floor an unsuitable nidus for the bubonic microbe. Although, as shown in previous experiments, there are many microbes in a cowdung floor not readily affected by it in the strength recommended, the special sensitiveness of the bubonic microbe to acids in general and to sulphuric acid in particular makes it likely that the latter substance will be efficient when used on such a floor. The acid will slowly diffuse to the deeper layers and combine with calcium salts and various alkaline substances that may be present. But the upper layers which are in most need of disinfection are most likely to be affected, and the acid will be less quickly neutralized if the floor has been treated with acid sublimate solution on the preceding day. In a locality in which the soil is highly calcareous, sulphuric acid is not likely to be a convenient disinfection for cowdung floors.

A further consideration bearing on the choice of an antiseptic depends on a view that is generally held by those having experience of plague, namely, that the virus is sooner or later destroyed by ventilation. As I have elsewhere shown, the plague microbe is somewhat resistant to the action of drying, and hence it is difficult to believe that the asserted benefit of ventilation is only due to dessication tending to destroy the microbe. Its action is more likely to be due to the oxidation processes that are produced by the evaporation of water in the presence of air and light. Many authorities have brought forward reasons for believing that the destruction of microbes through the action of light is in reality due to an oxidation process. Microbes are found not to be destroyed by light when exposed to it under condition in which oxidation processes cannot occur. My experiments have further shown that bubonic microbe is very susceptible to the action of such oxidising agents as chloride of lime and permanganate of potassium. If the evidence in favour of the use of ventilation is considered to be sufficient to justify the costly and troublesome method of removing the roofs of houses, and if the good effects of ventilation are admitted to be due to oxidation, ought not cheap and convenient oxidising agents such as permanganate of potassium to be used in combating the plague. Unfortunately in the case of cowdung and mud floors it is not likely to be practicable to employ sufficient permanganate to produce the effect desired. It might be possible in better built houses with cement floors. Permanganate might be used in water suspected of being infected, such as water used by dhobies for washing infected clothes. But owing to the risk of insufficient quantities being employed, it would be most objectionable to put it into the hands of unskilled workers for ordinary purposes. I have shown above that a mixture of sulphuric acid permanganate is more active

in destroying microbes than either of these substances used separately. Such a mixture would have the further advantage of removing smells from dwelling rooms, such smells being unaffected by corrosive sublimate. But it must be borne in mind that the sulphuric acid enters into the reaction, and is decomposed with the permanganate. Hence the addition of permanganate to dilute sulphuric acid may diminish the durability of the effects of the latter. Strong solutions of permanganate mixed with dilute sulphuric acid slowly decompose with liberation of ozone. With concentrated sulphuric acid the reaction is violent.

It must further be borne in mind that coolies employed in disinfecting work may not carry out the process thoroughly. Hence it would be preferable for the disinfection of a room to be carried out twice wherever practicable. In the case of one of the rooms disinfected in Hardwar and referred to above, I told the coolies that as soon as they had finished, I should come to see that they had done their work properly. Nevertheless after they had finished, I found some undisturbed cobwebs in a corner of the room, although they had splashed the disinfectant over the rest of the walls and the whole of the floor and ceiling.

The above considerations lead me to suggest the following rules for treatment of infected buildings :—

- (1) In the case of corrugated iron latrines, isolated pucca buildings, and other pucca buildings in which the work can be done with safety under intelligent supervision, a layer of dry grass or other inflammable material, at least two inches thick, should be laid over the whole of the floor and burnt. Afterwards the whole of the interior of the building should be washed out with a solution containing one part in 250 of sulphuric acid.
- (2) In the case of dwelling rooms in which there are definite grounds for believing infection to be present, the whole of the interior should be first washed with a solution of corrosive sublimate of 1 in 1,000 strength to which hydrochloric acid in the proportion of 2 in 1,000 has been added. On the following day the rooms should, if possible, be washed out with the dilute sulphuric acid.
- (3) In case of dwelling rooms in which there is no actual evidence of infection, but which are being merely cleaned out as a precautionary measure, the dilute sulphuric acid need alone be used. The inhabitants should be advised not to "lepo" the floors after this has been done, with the

unfortunately necessary exception of the part of the floor near the cooking place.

(4) Dilute sulphuric acid should be used in large quantities for washing out passages, courtyards, and surface drains.

(5) In order to diminish the risk of coolies being burnt by having to handle strong sulphuric acid, it should be diluted with an equal bulk of water at the dispensary before being sent out. To make a dilution containing one part in 250, three ounces of strong sulphuric acid, or six ounces of the acid mixed with its own bulk of water, should be added to every "nand" of water: an ordinary "nand" holds nearly four gallons. A rough indication as to whether or not water has been added to sulphuric acid may be obtained by adding pure sugar to some of the acid. If sulphuric acid contains more than 40 per cent. of water, the mixture will not turn black during the next hour. The sugar employed should be slightly moist.

Though my experiments are not sufficiently advanced for me to be able to give a definite opinion, I may point out the probability that clothes, the hands, etc., are far more easy to free from the bubonic infection than mud floors, and in such cases therefore a wider choice of antiseptics is permissible.

REPORT BY SURGEON-CAPTAIN DYSON, DEPUTY SANITARY COMMISSIONER ON DISINFECTION WITH CORROSIVE SUBLIMATE AT BULSAR, NO. B. P.—157, DATED THE 21ST JULY 1897.

"In reply to your memorandum No. 1472 of 1897, forwarding a copy of a letter from the Colonial Secretary, Colombo (herewith returned), I have the honour to submit the following statement. Briefly I may state that the use of perchloride of mercury for disinfecting purposes proved such a success in Bulsar that any further treatment of plague infected houses was found unnecessary.

2. The plan adopted was as follows:—

In the case of a badly infected quarter of the town the occupants were turned out of their houses and accommodated temporarily in sheds.

Every house, infected and non-infected, was then thoroughly washed down, inside and outside, with solution of perchloride of mercury (1 to 1,000) by means of fire-engines and hand-pumps.

All furniture, bedding and clothing found in the houses was similarly treated.

On completion of the houses the sheds and their occupants were attacked, special care being taken that no bedding or clothing escaped disinfection.

- After a week's immunity from plague the people were allowed to re-occupy their houses.

In less deeply infected quarters it was not found necessary to disturb the occupants, except during the operation of disinfection, and for the few hours during which the houses were drying.

3. The following statistics will give some idea as to the results obtained :—

(a) *Nana Taivad*—Contains 141 houses, of which 51 were known to be infected. Two-thirds of the houses were occupied by about 300 Muhammadans—

Total number of cases of plague	...	...	93
Do. deaths	...	...	68
Disinfection was begun March 29th, when the daily average of cases for the previous week was	...	...	4
Disinfection was completed April 4th.			
Daily average of cases from April 4th to 11th	...	...	0.5

After April 11th only three cases occurred, one of whom was an attendant on a sick relative.

(b) *Mota Taivad*—Contains 151 houses, of which 98 were known to be infected; all houses occupied by about 500 Muhammadans—

Total number of cases of plague	...	...	128
Do. deaths	...	...	98
At the time of disinfection, April 13th, the daily average of cases was	...	...	5
After disinfection the daily average was	...	...	1

Nine cases in all occurred after disinfection was completed.

(c) *Ghanchivad*.—In the affected area there are 92 houses, in 19 of which cases of plague had occurred, and in the 92 houses there were about 300 Muhammadans—

Total number of cases of plague	...	...	30
Do. deaths	...	...	24

There was an average of one case daily up to the time disinfection was completed, while only 4 cases occurred after disinfection.

(a) *Khattrivad*.—In the infected area there are 180 houses, 124 of which cases of plague had occurred; only two-thirds of the houses were occupied by about 300 people—

Total number of cases of plague	...	...	50
For the week ending April 17th, when disinfection was completed, the daily average of cases was	...	...	2
From April 18th to 24th the daily average of cases was	...	...	1
Subsequently 7 cases occurred.			

In calculating the number of cases which occurred in any quarter after disinfection had been completed, a proportion should be deducted, as representing those persons already infected at the time of disinfection.

4. The accompanying* Chart A shows the continuous fall after disinfection with perchloride of mercury was begun.

5. The two quarters (a) and (b) were deeply infected areas, and it was deemed advisable to have the houses vacated during the process of disinfection, so as to reduce the number of subsequent operations as much as possible.

The other two quarters (c) and (d) were but lightly affected, and here the occupants were not disturbed, and although subsequent cases occurred, necessitating a second, and in some cases a third, disinfection of one or two houses, the disease never attained epidemic proportions.

I think it is a fair conclusion that the two last quarters, the Ghanchivad and the Khattrivad, were saved from complete infection by rapid disinfection, extending wide of the infected houses.

It may reasonably be objected, however, that perhaps the disease was on the decline at the time; but this objection is, I think, negated by a reference to Chart A,* which shows, after March 29th, a much more rapid and continuous fall than one would expect in a declining epidemic. Moreover up to the very end there was no diminution in the virulence of the disease.

6. Stated shortly, simple disinfection with perchloride of mercury presents many advantages over more elaborate operations.

(a) It is simple, cheap and efficient, and ensures a great saving of time and labour. Further experience will probably show that a weaker solution (1 to 2,000) is sufficiently strong.

- (b) It ensures almost complete immunity from infection to labourers.
- (c) It entails a minimum of discomfort and inconvenience on the occupants of a house.
- (d) Perchloride of mercury is odourless and nonvolatile. The former quality recommends it to natives, and the second gives a greater chance of a permanently good effect.
- (e) The solution of the salt neither stains, nor removes colour from, the finest fabrics.

7. I trust I may be pardoned a slight digression in order to bring to notice a few points, which seem very necessary to bear in mind, for the success of any plague-preventive operations. It will be generally admitted that people may carry the virus of plague to a house and may also become infected from a house into which the germs of disease have been conveyed by rats.

There are thus two factors to deal with; a human population above ground, whose movement can be more or less controlled; and an animal population, under ground, whose wanderings cannot be checked.

Therefore it is not sufficient to follow in the train of the disease, disinfecting only where the disease shows itself by its human victims.

The attack should be directed from all sides and over wide areas, thereby saving many houses and families from infection.

Again bedding and clothing seem to play an important part in conveyance of infection.

This was well illustrated among the Mahomedans, among whom 46 cases occurred after they had vacated their houses.

Therefore disinfection of bedding and clothing is equally important to that of houses.

